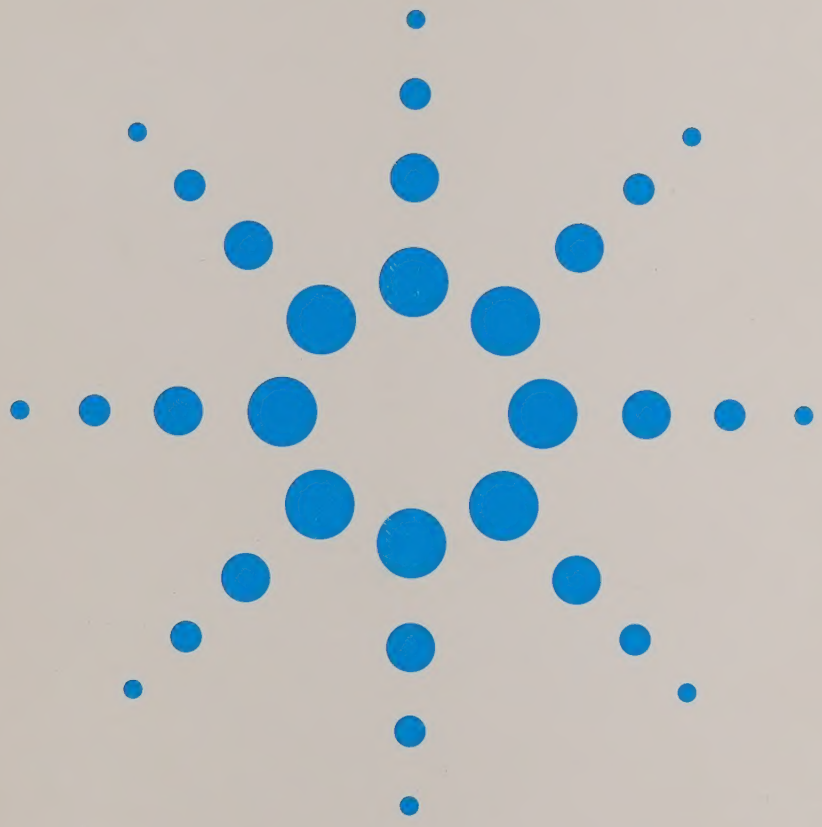
# E8356A, E8357A, and E8358A PNA Series Network Analyzers Installation and Quick Start Guide



Agilent Technologies

# Installation and Quick Start Guide

## Agilent Technologies
## PNA Series RF Network Analyzers
## E8356A, E8357A, and E8358A

**Manufacturing Part Number: E8356-90001**
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# Notice

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## Certification

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.

### Regulatory and Warranty Information

The regulatory and warranty information is located in Chapter 5 , "Safety and Regulatory Information."

## Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products. For any assistance, contact your nearest Agilent Technologies sales or service office. See Table 5-1 on page 5-4 for the nearest office.

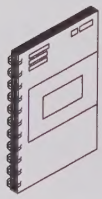
## Safety Notes

The following safety notes are used throughout this manual. Familiarize yourself with each of the notes and its meaning before operating this instrument. Additional safety information is located in Chapter 5 , "Safety and Regulatory Information."

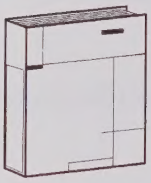
| | |
|---|---|
| **WARNING** | **Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.** |

| | |
|---|---|
| **CAUTION** | Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, would result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met. |

# Documentation Map



The *Installation and Quick Start Guide* provides procedures for installing, configuring, and verifying the operation of the analyzer. It also will help you familiarize yourself with the basic operation of the analyzer.



The optional *Service Guide* provides information on troubleshooting and servicing your analyzer.

The optional printed version of the online Network Analyzer Help provides the Help system in printed form.

The **CD-ROM** provides the *Installation and Quick Start Guide,* the *Service Guide,* and the online Network Analyzer Help in PDF format for viewing or printing from a PC. It also provides the Network Analyzer Product Overview multimedia presentation and the online Network Analyzer Help in formats that can be used on your PC.

# How to Use This Guide

This guide uses the following conventions:

| | |
|---|---|
| **Front Panel Key** | This represents a key physically located on the instrument. |
| **Windows Interface** | This represents window titles, menu items, or dialog box selections in the Network Analyzer or the Microsoft® Windows® 2000 Professional personal computer operating system and applications. |
| `Screen Text` | This represents text displayed on the instrument's screen. |

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# Contents


**1. Installing Your Analyzer**

STEP 1. Check the Shipment ..... 1-3
STEP 2. Meet Electrical and Environmental Requirements ..... 1-6
STEP 3. Set Up the Analyzer for Use on a Bench Top or in an Equipment Rack ..... 1-7
To Set Up the Analyzer for Bench Top Use ..... 1-8
To Set Up the Analyzer for Use in an Equipment Rack (Option 1CP - Rack Mounting with Handles) ..... 1-10
To Set Up the Analyzer for Use in an Equipment Rack (Option 1CM - Rack Mounting without Handles) ..... 1-13
STEP 4. Connect the Accessories to the Analyzer ..... 1-16
To Connect the Accessories Using the Basic Setup (Without a USB Hub) ..... 1-17
To Connect the Accessories Using the Complete Setup (With a USB Hub) ..... 1-19
STEP 5. Start Up the Analyzer for the First Time ..... 1-23
STEP 6. Perform Additional Administrative Tasks ..... 1-30
To Create an Emergency Repair Disk ..... 1-31
To Set Up Additional Network Analyzer Users ..... 1-37
STEP 7. Run the Operator's Check ..... 1-45

**2. Becoming Familiar with Your Analyzer**

Front Panel ..... 2-4
Display ..... 2-6
Keypad ..... 2-8
Rear Panel ..... 2-12

**3. Getting Started with Measurements**

Making Basic Measurements using a Mouse and Keyboard ..... 3-3
Set Up the Measurement ..... 3-3
Calibrate the Setup ..... 3-8
Display a Second Window with Two Measurement Traces ..... 3-12
Display Multiple Channels in a Window ..... 3-15
Display a Third Window with a Different Format ..... 3-18
Making Basic Measurements using the Front Panel Keypad ..... 3-21
Set Up the Measurement ..... 3-21
Calibrate the Setup ..... 3-25
Display a Second Window with Two Measurement Traces ..... 3-29
Display Multiple Channels in a Window ..... 3-31
Display a Third Window with a Different Format ..... 3-33

**4. Becoming Familiar with Help**

Network Analyzer Product Overview ..... 4-3
Network Analyzer Help ..... 4-4
Using the Help Home Page to Find Information ..... 4-4
Using the Index (Keyword Search) to Find Information ..... 4-9
Using Contents to Find Information ..... 4-10
Using the Glossary to Find Information ..... 4-11

# Contents

Using the Context-sensitive Help to Find Information . . . . . 4-12
Network Analyzer Help on the Web . . . . . 4-13

**5. Safety and Regulatory Information**
General Information . . . . . 5-3
Maintenance . . . . . 5-3
Assistance . . . . . 5-3
Shipment for Service . . . . . 5-3
Safety Symbols . . . . . 5-5
General Safety Considerations . . . . . 5-6
Safety Earth Ground . . . . . 5-6
Before Applying Power . . . . . 5-6
Servicing . . . . . 5-7
Regulatory Information . . . . . 5-8
Instructions for Use . . . . . 5-8
Instrument Markings . . . . . 5-9
Declaration of Conformity . . . . . 5-10
Compliance with German Noise Requirements . . . . . 5-11

# 1 Installing Your Analyzer

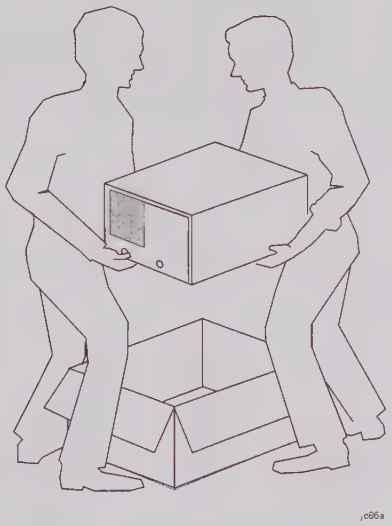
This chapter shows you how to install your PNA-series network analyzer and confirm the correct operation. There are six major steps to installing the analyzer and confirming its operation. Each of these steps is listed below.


- "STEP 1. Check the Shipment" on page 1-3
- "STEP 2. Meet Electrical and Environmental Requirements" on page 1-6
- "STEP 3. Set Up the Analyzer for Use on a Bench Top or in an Equipment Rack" on page 1-7
- "STEP 4. Connect the Accessories to the Analyzer" on page 1-16
- "STEP 5. Start Up the Analyzer for the First Time" on page 1-23
- "STEP 6. Perform Additional Administrative Tasks" on page 1-30
- "STEP 7. Run the Operator's Check" on page 1-45

# STEP 1. Check the Shipment

**1.** Unpack the contents of the shipping container.

**WARNING** **The network analyzer is heavy. Use proper lifting techniques.**



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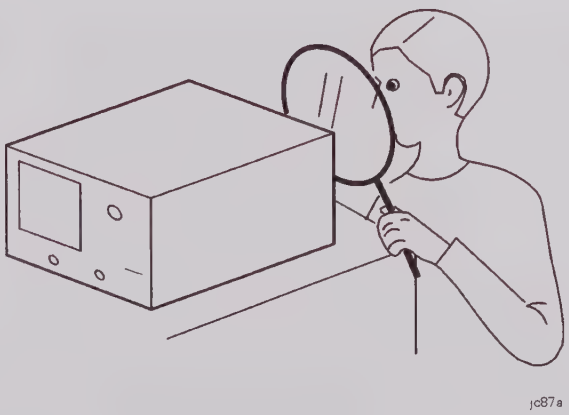
**2.** Carefully inspect the analyzer to make sure that it was not damaged during shipment.



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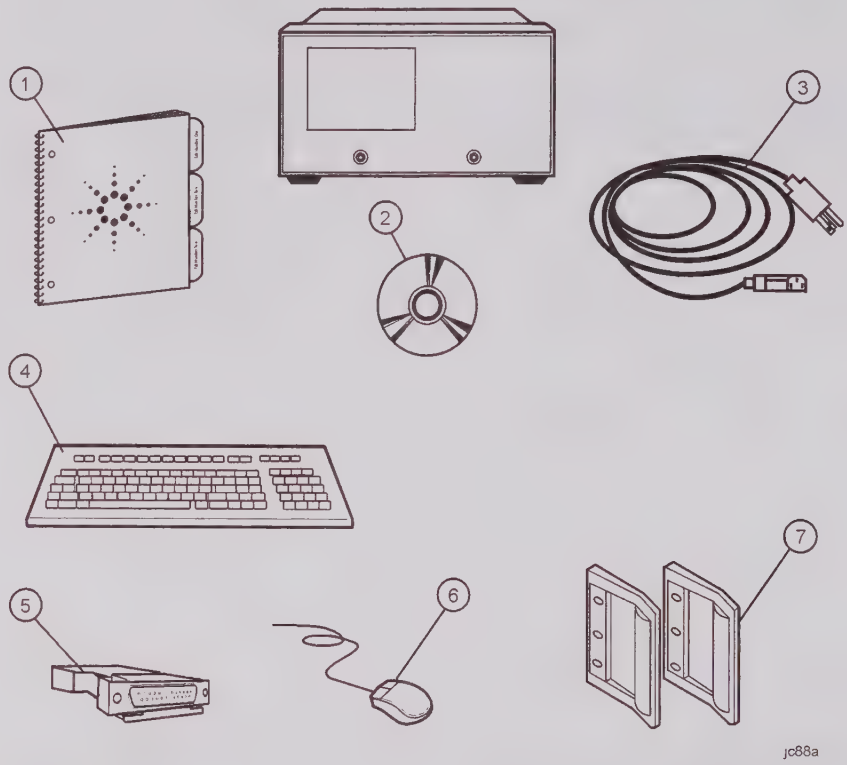
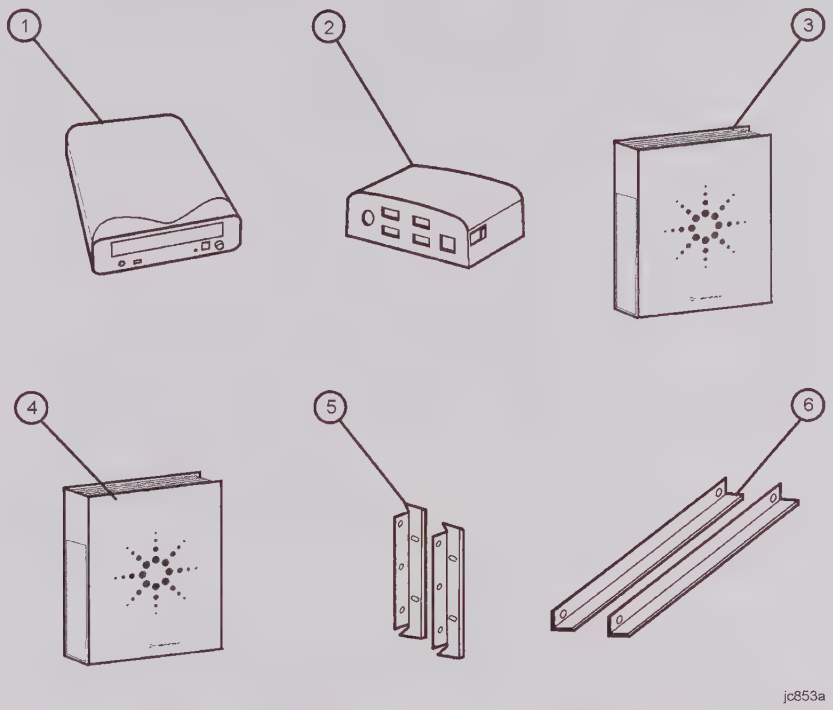
**NOTE** If your analyzer was damaged during shipment, contact your nearest Agilent Technologies office or sales representative. A list of Agilent Technologies sales and service offices is provided in Table 5-1 on page 5-4.

**3.** Verify that the following accessories have been included with the analyzer.




| Item Number | Part Number | Part Description |
|---|---|---|
| 1 | E8356-90001 | Installation and Quick Start Guide |
| 2 | E8356-10001 | PNA Series RF Network Analyzer Documentation CD-ROM |
| 3 | Unique to country | AC Power Cord |
| 4 | 1150-7788 | USB Keyboard |
| 5 | 1253-4226 | Parallel Port Adapter |
| 6 | 1150-1199 | USB Mouse |
| 7 | 5063-9229 | Front Handle Kit |

**4.** If you ordered any of the following options, verify that these accessories were included in the shipment. *Note that if you ordered Option 1CM or 1CP, these are shipped in a separate container.*




| Item Number | Option Number | Part Description |
|---|---|---|
| 1 | AM8 | Read/Write CD-ROM Drive |
| 2 | B30 | USB Hub |
| 3 | 0BW | Service Guide |
| 4 | AVK | Printed Version of Help – English Language |
| | ABF | Printed Version of Help – French Language |
| | ABJ | Printed Version of Help – Japanese Language |
| | ABE | Printed Version of Help – Spanish Language |
| | ABD | Printed Version of Help – German Language |
| 5 | 1CM | Rack Mount Flange Kit (For use without handles) |
| 6 | | Rack Mount Rail Set |
| 5 | 1CP | Rack Mount Flange Kit (For use with handles) |
| 6 | | Rack Mount Rail Set |

# STEP 2. Meet Electrical and Environmental Requirements

**1.** Ensure the available AC power source meets the following requirements:

**CAUTION** This instrument has autoranging line voltage input. Be sure the supply voltage is within the specified range.

The specified range for the power requirements is:

- 90 – 132 $V_{AC}$
- 48 – 66 Hz / 400 Hz (single phase)

*- or -*

- 198 – 264 $V_{AC}$
- 48 – 66 Hz (single phase)

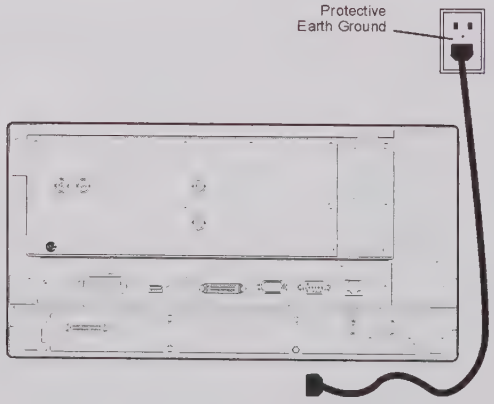
The instrument power consumption is 600 VA maximum.

**2.** Ensure the operating environment meets the following requirements:

- 0 to 40 °C
- 5% to 95% relative humidity at 40 °C (non-condensing)
- 0 to 4,500 meters (0 to 14,760 feet) altitude

**NOTE** Some analyzer performance parameters are specified for 25 °C. Later, you can refer to the Help system for the complete specifications.

**3.** Verify that the AC power cable is not damaged, and that the power-source outlet provides a protective earth contact.




**CAUTION** Always use the three-prong AC power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage.

# STEP 3. Set Up the Analyzer for Use on a Bench Top or in an Equipment Rack

The analyzer can be set up to be used on a bench top or in an equipment rack. This step guides you through setting up the analyzer for use in both situations. Furthermore, when installing the analyzer in an equipment rack, the analyzer can be set up with handles (option 1CP) or without handles (option 1CM).

In all installations, consider the following ventilation requirements when deciding where to set up your analyzer.

**CAUTION** **Ventilation Requirements:** When installing the product in a cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the instrument by 4 °C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.

Refer to the section, listed below, that applies to your installation.

- **For bench top setup**, continue with "To Set Up the Analyzer for Bench Top Use" on page 1-8.
- **For equipment rack installation with handles**, continue with "To Set Up the Analyzer for Use in an Equipment Rack (Option 1CP - Rack Mounting with Handles)" on page 1-10.
- **For equipment rack installation without handles**, continue with "To Set Up the Analyzer for Use in an Equipment Rack (Option 1CM - Rack Mounting without Handles)" on page 1-13.

## To Set Up the Analyzer for Bench Top Use

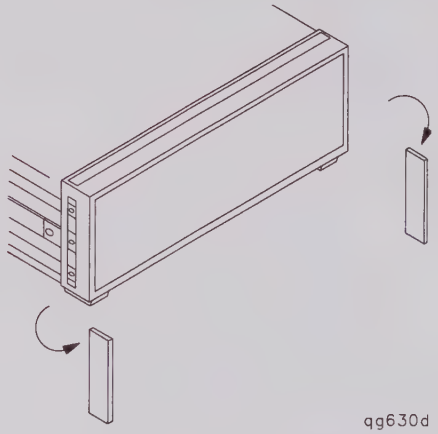
When you set up the analyzer for bench top use, you will affix the handles to the analyzer.

**1.** Ensure that the front handle kit is complete.

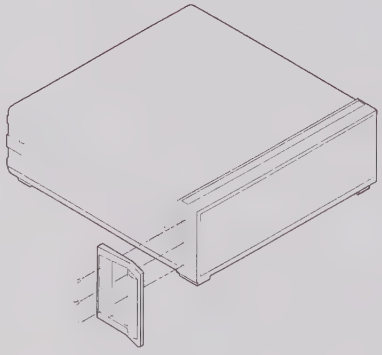
- 6 Screws
- 2 Side Trim Strips (self-adhesive)
- 2 Handles
- Installation Instructions

**NOTE** If any items are damaged or missing from the kit, contact the nearest Agilent sales or service office to order a replacement kit (refer to Table 5-1 on page 5-4). Items within the kit are not individually available.

**2.** Remove the trim strips from the analyzer. Use a screwdriver to peel up the corner. Then, pull the trim away from the analyzer.

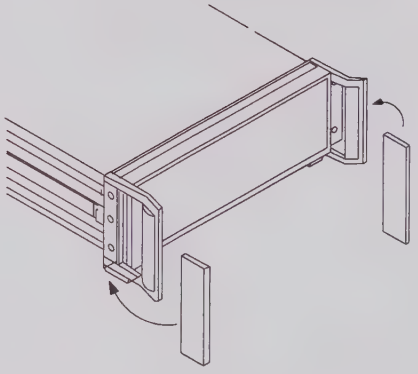



**3.** Attach the handles to the sides of the analyzer. Use three screws for each handle.

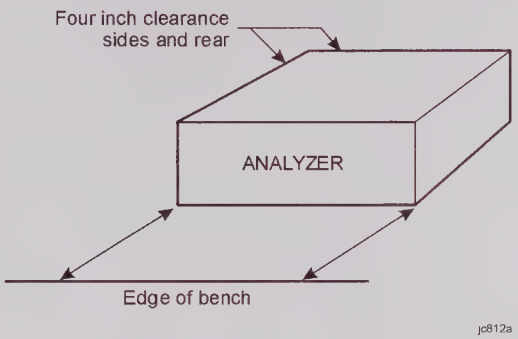


**WARNING** **If an instrument handle is damaged, you should replace it immediately. Damaged handles can break while you are moving or lifting the instrument and cause personal injury or damage to the instrument.**

**4.** Place the new trim strip over the screws on the handles.



**5.** Place the instrument on the bench making sure that there is *at least four inches* of clearance on the sides and back of the analyzer for adequate ventilation.




**CAUTION** Consider the ventilation requirement described in "STEP 3. Set Up the Analyzer for Use on a Bench Top or in an Equipment Rack" on page 1-7 when selecting the location of your analyzer.

**6.** Continue with "STEP 4. Connect the Accessories to the Analyzer" on page 1-16.

## To Set Up the Analyzer for Use in an Equipment Rack (Option 1CP - Rack Mounting with Handles)

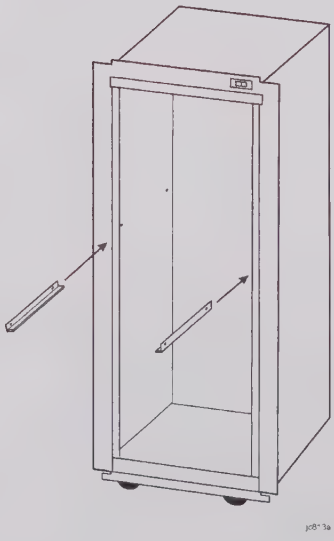
When you set up the analyzer for use in an equipment rack, you will install the rack mount rail set in the rack to support the weight of the analyzer. Affix the rack mount flanges to the analyzer, and secure the analyzer to the equipment rack.

**1.** Ensure that the front handle kit, the rack mount flange kit, and the rack mount rail set are complete.

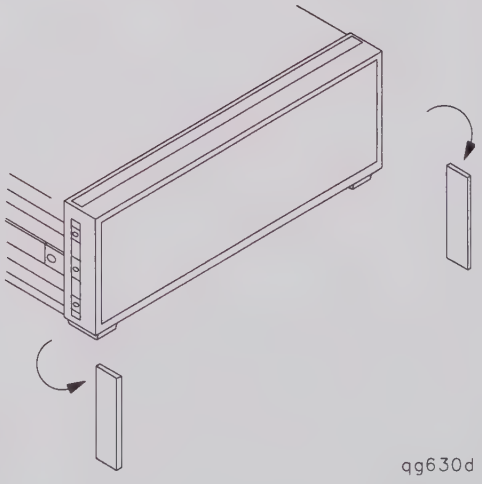
| Handle Kit Contents | Flange Kit Contents | Rail Set Contents |
|---|---|---|
| • 6 Screws<br>• 2 Side Trim Strip<br>• 2 Handles<br>• Installation Instructions | • 6 Screws (Long)<br>• 4 Screws with Washers<br>• 4 Nuts with Metal Clips<br>• 2 Flanges<br>• Installation Instructions | • 4 Screws<br>• 4 Nuts with Metal Clips<br>• 2 Rails<br>• Installation Instructions |

**NOTE** If any items are damaged or missing from a kit, contact the nearest Agilent sales or service office to order a replacement kit (refer to Table 5-1 on page 5-4). Items within these kits are not individually available.

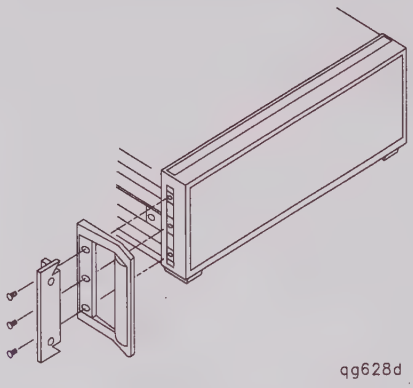
**2.** Install the rack mount rails into the equipment rack using the instructions provided with the rail set. Consider the height of the analyzer is 222 mm (8.75 inches) when installing the rail set.



**3.** Remove the trim strips from the analyzer. Use a screwdriver to peel up the corner. Then, pull the trim away from the analyzer.

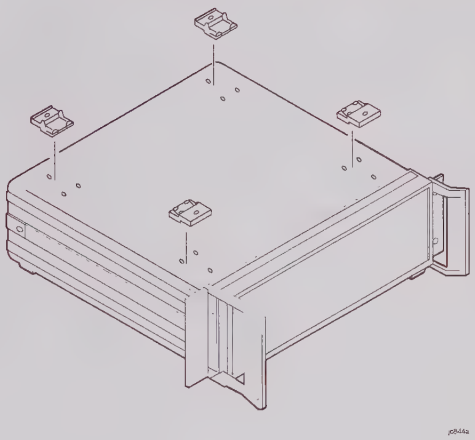


**4.** Attach the cabinet mount flanges and the handles to the sides of the front panel, using three long screws per side. (Attach the flanges to the outside of the handles.)

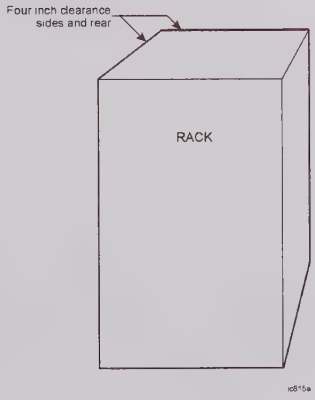



**WARNING** **If an instrument handle is damaged, you should replace it immediately. Damaged handles can break while you are moving or lifting the instrument and cause personal injury or damage to the instrument.**

**5.** Remove the feet before cabinet mounting the analyzer using the directions imprinted on the feet.

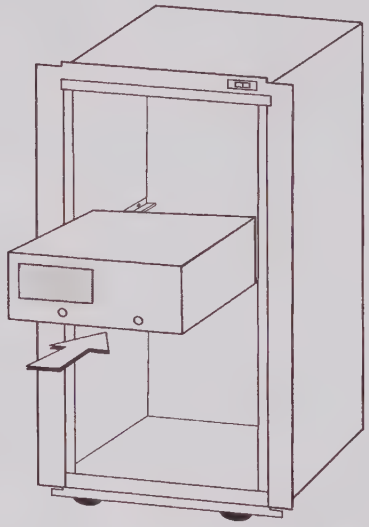


**6.** Ensure there are at least four inches of clearance between the sides and back of the system cabinet for adequate ventilation.




**CAUTION** Consider the ventilation requirements described on page 1-7 when selecting the location of your analyzer.

**7.** Lift the analyzer and slide it onto the rails that you installed earlier from the front of the equipment rack. Secure the analyzer to the equipment rack using the screws with washers and metal-clipped nuts provided in the flange kit.



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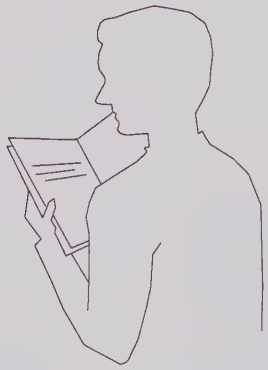
**8.** Continue with "STEP 4. Connect the Accessories to the Analyzer" on page 1-16.



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# To Set Up the Analyzer for Use in an Equipment Rack (Option 1CM - Rack Mounting without Handles)

When you set up the analyzer for use in an equipment rack, you will install rails in the rack to support the weight of the analyzer, affix the rack mount flanges to the analyzer, and secure the analyzer to the equipment rack.

**1.** Ensure that the rack mount flange kit and the rack mount rail set are complete.

**Flange Kit Contents**

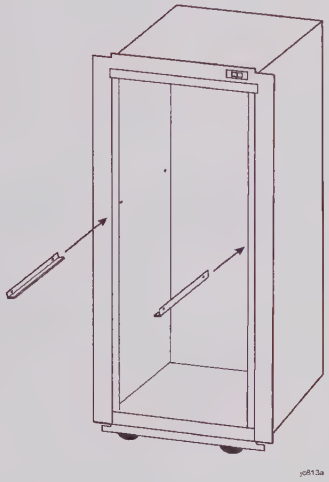
- 6 Screws
- 4 Screws with Washers
- 4 Nuts with Metal Clips
- 2 Flanges
- Installation Instructions

**Rail Set Contents**

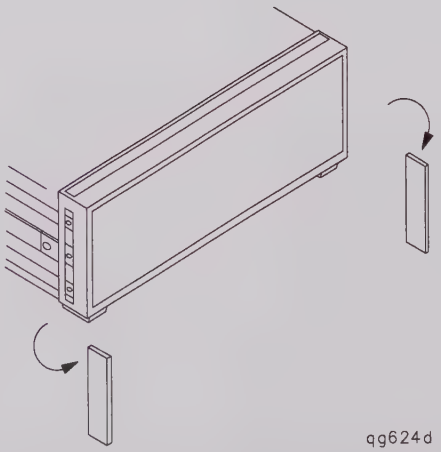
- 4 Screws
- 4 Nuts with Metal Clips
- 2 Rails
- Installation Instructions

**NOTE** If any items are damaged or missing from a kit, contact the nearest Agilent sales or service office to order a replacement kit (refer to Table 5-1 on page 5-4). Items within these kits are not individually available.

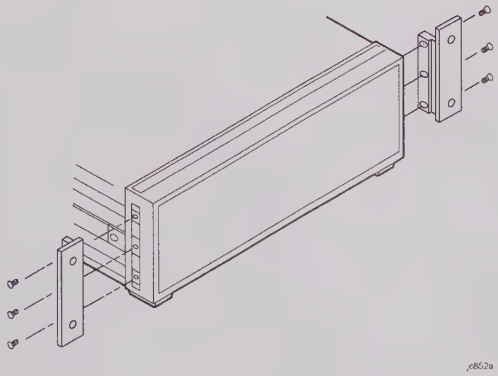
**2.** Install the rack mount rails into the equipment rack using the instructions provided with the rail set. Consider the height of the analyzer is 222 mm (8.75 inches) when installing the rail set.



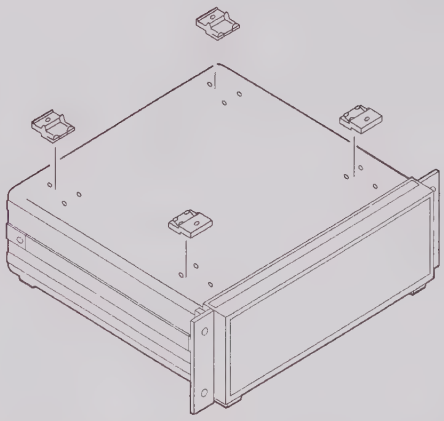
**3.** Remove the trim strips from the analyzer. Use a screwdriver to peel up the corner. Then, pull the trim away from the analyzer.



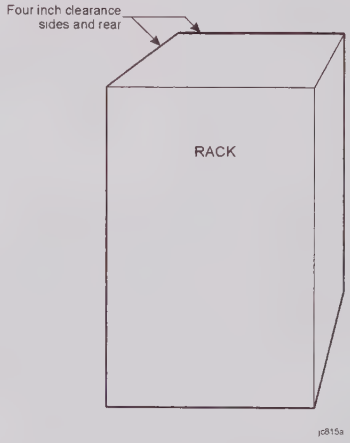

**4.** Using three long screws, attach a flange on each the side of the front panel.



**5.** Remove the feet before cabinet mounting the analyzer using the directions imprinted on the feet.

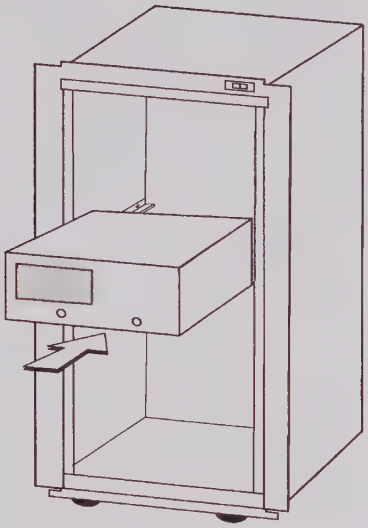


**6.** Ensure there are at least four inches of clearance between the sides and back of the system cabinet for adequate ventilation.




**CAUTION** Consider the ventilation requirements described on page 1-7 when selecting the location of your analyzer.

**7.** From the front of the equipment rack, lift the analyzer and slide it onto the rails that you installed earlier. Secure the analyzer to the equipment rack using the screws with washers and metal-clipped nuts provided in the flange kit.



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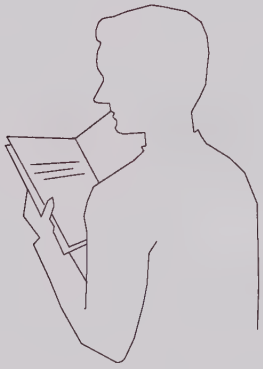
**8.** Continue with "STEP 4. Connect the Accessories to the Analyzer" on page 1-16.



qg646d

# STEP 4. Connect the Accessories to the Analyzer

The PNA series network analyzer has several standard and optional accessories that can be connected to the analyzer through the Universal Serial Bus (USB). These accessories include:

- Mouse (standard)
- Keyboard (standard)
- Read/Write CD-ROM drive (optional)
- USB Hub (optional)
- Electronic Calibration (ECal) Modules (separate product)
- Printer (separate product)

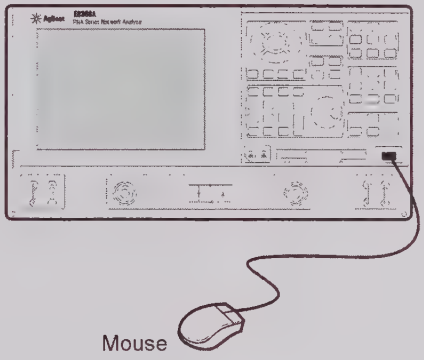
There are two USB ports on the analyzer which allows the analyzer to control two USB devices at a time. However, an optional USB hub provides you with additional connector ports to the USB. This provides the capability to connect more accessories that just the mouse and the keyboard. There are two types of USB hubs: self powered and bus powered. In order to provide you the maximum flexibility, it is recommended that the self powered hub be used. Typically, a bus powered hub will not be able to support accessories that require more than 100 mA.

On the analyzer, one USB port is located on the front panel and another USB port is located on the rear panel. This section shows you how to connect the network analyzer accessories in two different ways:

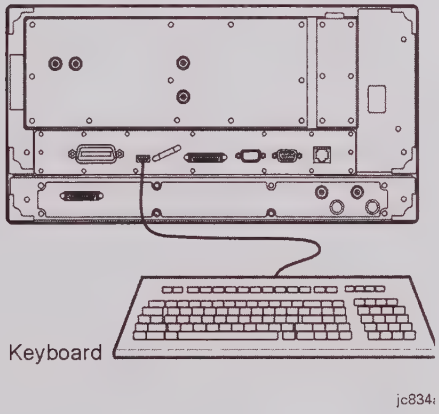
- **Basic setup**. A setup that connects only the mouse and the keyboard. For installation procedures using the basic setup, refer to "To Connect the Accessories Using the Basic Setup (Without a USB Hub)" on page 1-17.
- **Complete setup**. A setup that includes a USB hub, a mouse, a keyboard, one or more ECal modules, a printer, and a read/write CD-ROM. For installation procedures using the complete setup, refer to "To Connect the Accessories Using the Complete Setup (With a USB Hub)" on page 1-19.

# To Connect the Accessories Using the Basic Setup (Without a USB Hub)

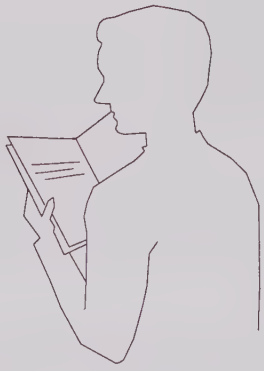
**1.** Connect the mouse's USB cable to the analyzer's front panel USB port.




**2.** Connect the keyboard's USB cable to the analyzer's rear panel USB port.



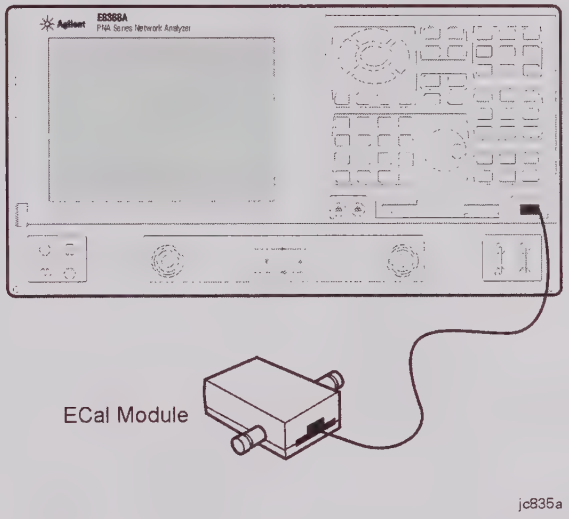
**3.** Continue with "STEP 5. Start Up the Analyzer for the First Time" on page 1-23.



qg646d

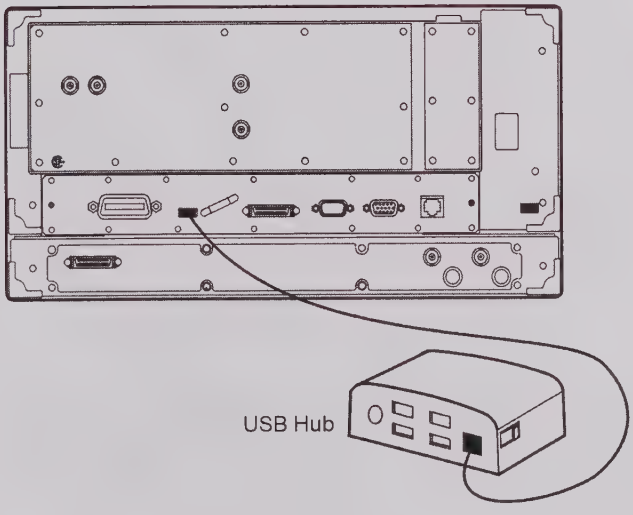
# To Connect the Accessories Using the Complete Setup (With a USB Hub)

**1.** If you are using an ECal module, connect one end of the USB cable (included in the ECal kit) to the module. Connect the other end of the USB cable to the USB port on the front panel of the analyzer. If you are *not* using an ECal module, connect the mouse's USB cable to the USB port (as shown in step 1 of "To Connect the Accessories Using the Basic Setup (Without a USB Hub)" on page 1-17).



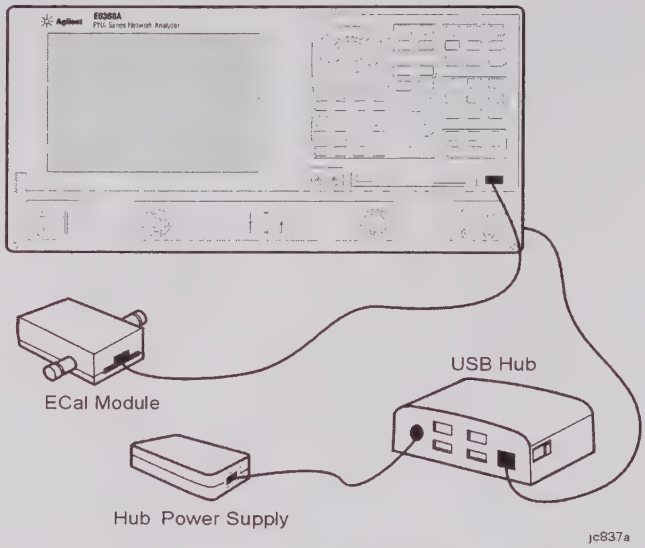

jc835a

**2.** Connect one end of the USB cable (included in the USB hub kit) to the hub. Connect the other end of the USB cable to the USB port on the rear panel of the analyzer.

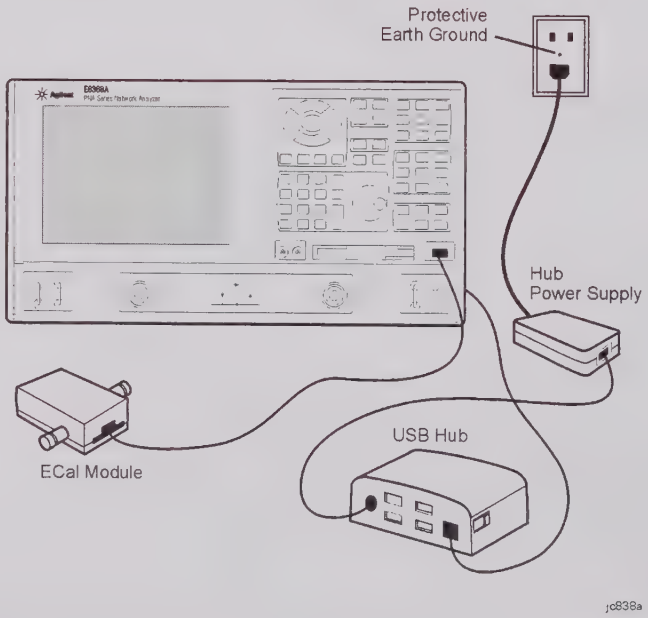



jc836a

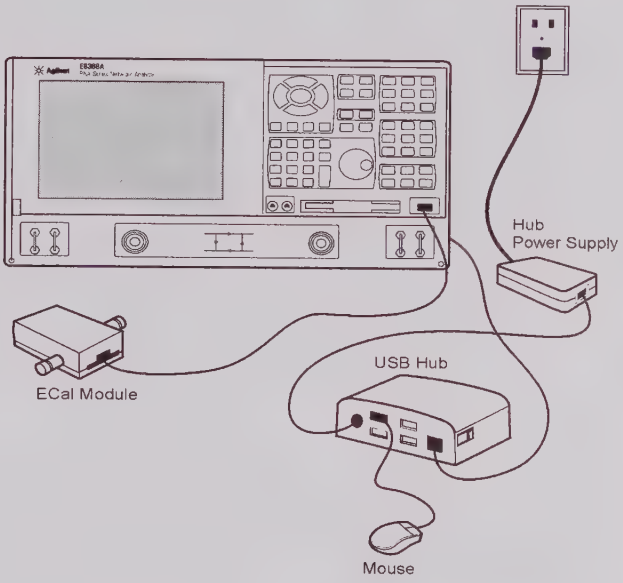
**3.** Using the hub documentation, connect the hub power supply to the hub.



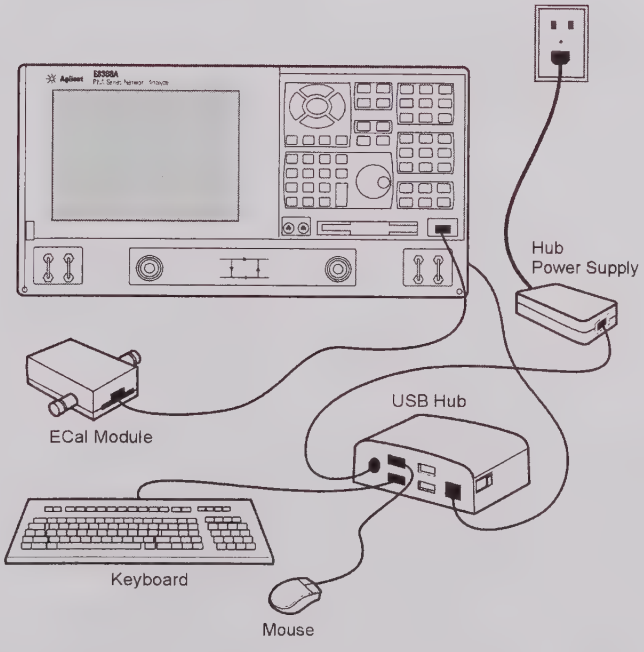

**4.** Connect the hub power supply to the AC power source.



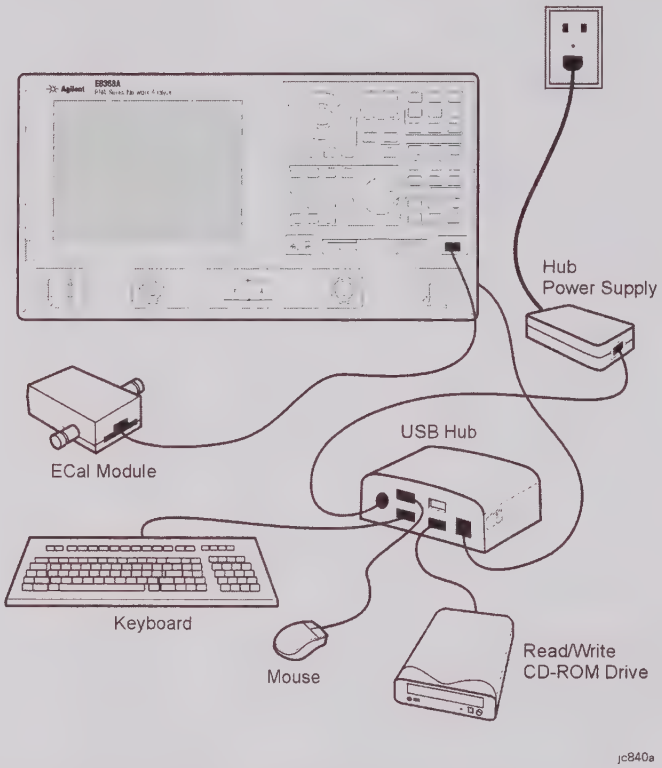
**5.** Connect the mouse's USB cable to an unused USB port on the hub. (This step does not apply if you connected the mouse to the front panel USB port in step 1.)



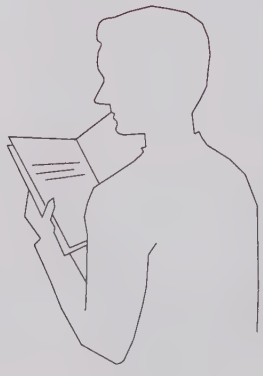

**6.** Connect the keyboard's USB cable to an unused USB port on the hub.



**7.** Connect the remaining USB accessories to a port on the hub using a USB cable for each accessory.




**8.** Continue with "STEP 5. Start Up the Analyzer for the First Time" on page 1-23.



# STEP 5. Start Up the Analyzer for the First Time

The Agilent PNA Series Network Analyzer is a network analyzer that operates on a personal computer (PC) platform with Microsoft® Windows® 2000 Professional as the operating system. When the PC boots up the first time, you will need to set up the PC. These instructions will guide you through these steps.

**CAUTION** Install the instrument so that the detachable power cord is readily identifiable and is easily reached by the operator. The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch. Alternatively, an externally installed switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be used as a disconnecting device.

**CAUTION** ***Only in an emergency,*** should the power cord be removed from the network analyzer without first turning the analyzer off and waiting for the analyzer to switch to hibernation state. Removing the power cord without the network analyzer in hibernation state ***is likely*** to damage to the analyzer.

**NOTE**

**Turning Off the Network Analyzer**

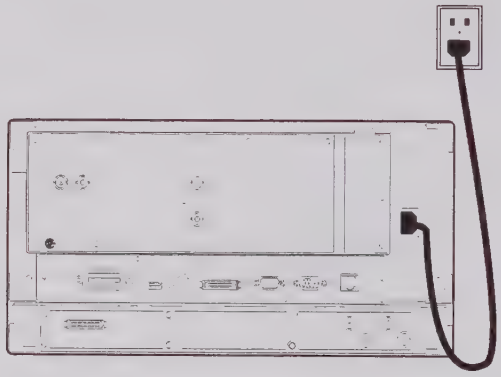
When you turn off the power to the network analyzer, simply press the On/Off switch momentarily. Do not hold down the switch. Do not repeatedly press the switch. Within a few seconds after pressing the On/Off switch, two banners (the first, reading "Ready to Hibernate", and the second, reading "Preparing to Hibernate") are displayed. Wait until the hibernation process turns off the power to the analyzer. The On/Off switch color changes from green to yellow when the analyzer has finished switching to hibernation state.

The hibernation state is the normal “Off” state. A small amount of standby power is supplied to the analyzer when it is in the hibernation mode. This standby power only supplies the power switch circuits. No other CPU-related circuits are powered during standby.

Only remove the power from the analyzer for specific reasons, such as moving or servicing the analyzer.

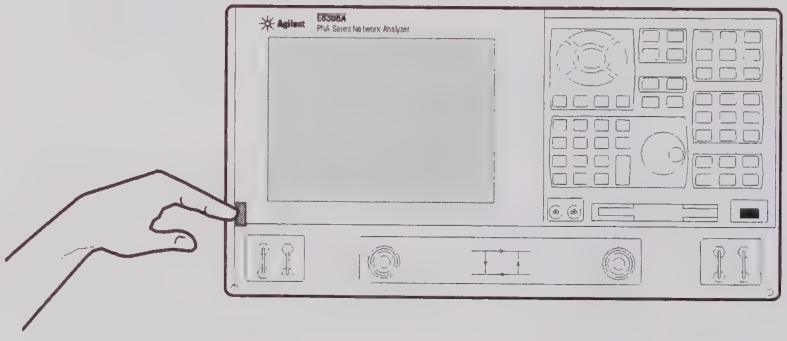
When the analyzer is in the hibernation state, pressing the On/Off switch wakes up the analyzer. The network analyzer application wakes up in the exact state that it was in before the analyzer was hibernated.

**1.** Connect the AC power cable from the power-source outlet to the AC input on the rear panel of the analyzer.



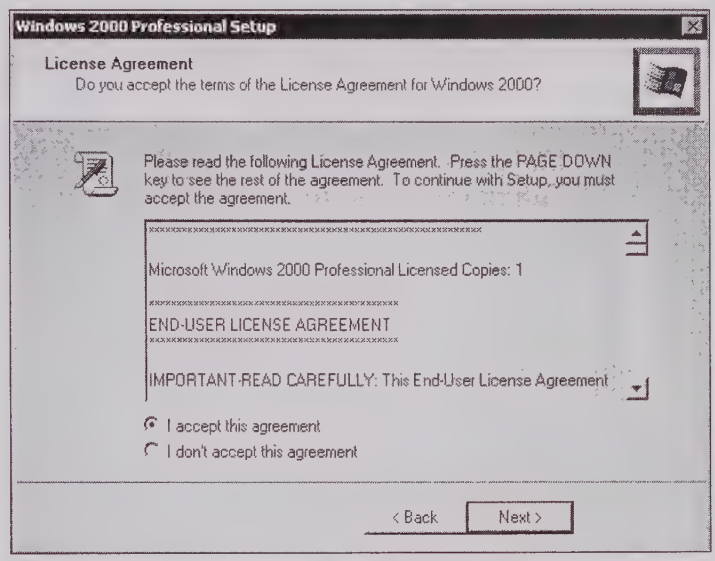
jc810a

**2.** Turn the analyzer on by pressing the front panel On/Off button. When the analyzer is turned on, the On/Off button changes color from yellow to green.

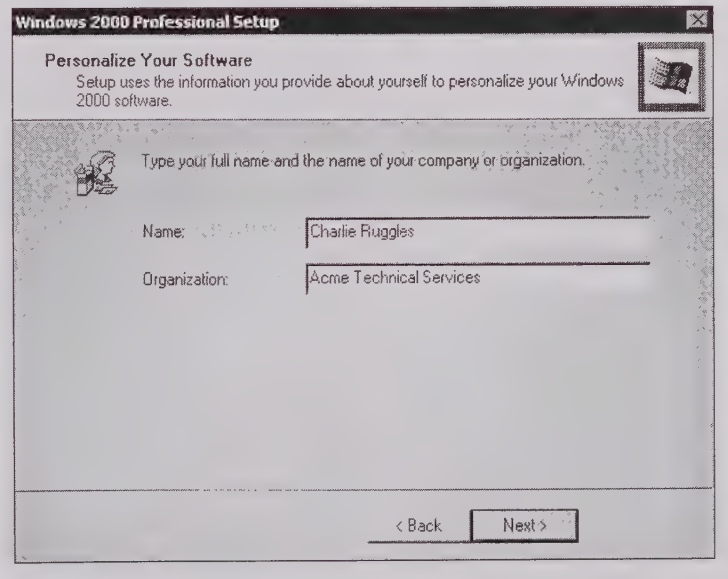



jc841a

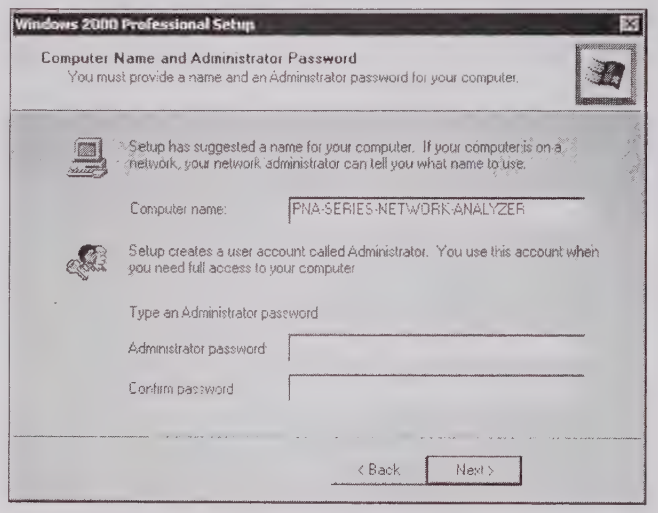
**3.** The analyzer takes approximately 3 minutes to boot up after the analyzer has ac power applied and it is turned on. Once the License Agreement is displayed, read the agreement and select **I accept this agreement**. Then, click **Next**.


Windows 2000 Professional Setup
License Agreement
Do you accept the terms of the License Agreement for Windows 2000?
Please read the following License Agreement. Press the PAGE DOWN key to see the rest of the agreement. To continue with Setup, you must accept the agreement.
Microsoft Windows 2000 Professional Licensed Copies: 1
END-USER LICENSE AGREEMENT
IMPORTANT-READ CAREFULLY: This End-User License Agreement
I accept this agreement
I don't accept this agreement
< Back
Next >

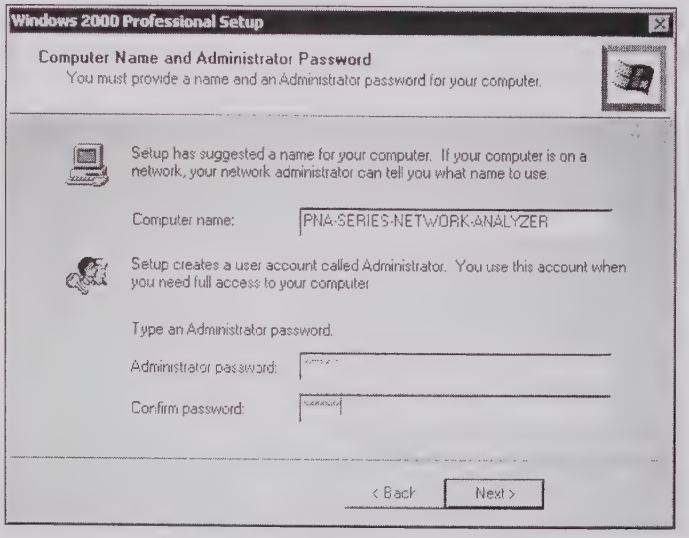
**4.** Type your full name in the **Name** box. Type the name of your company or organization in the **Organization** box. Then, click **Next**.


Windows 2000 Professional Setup
Personalize Your Software
Setup uses the information you provide about yourself to personalize your Windows 2000 software.
Type your full name and the name of your company or organization.
Name:
Charlie Ruggles
Organization:
Acme Technical Services
< Back
Next >

**5.** The software assigns a random computer name in conjunction with your input for your organization. You may use this name or change it. Note the name you use for the computer. If you are planning to connect the analyzer to your Local Area Network (LAN), contact your network administrator for the appropriate name.

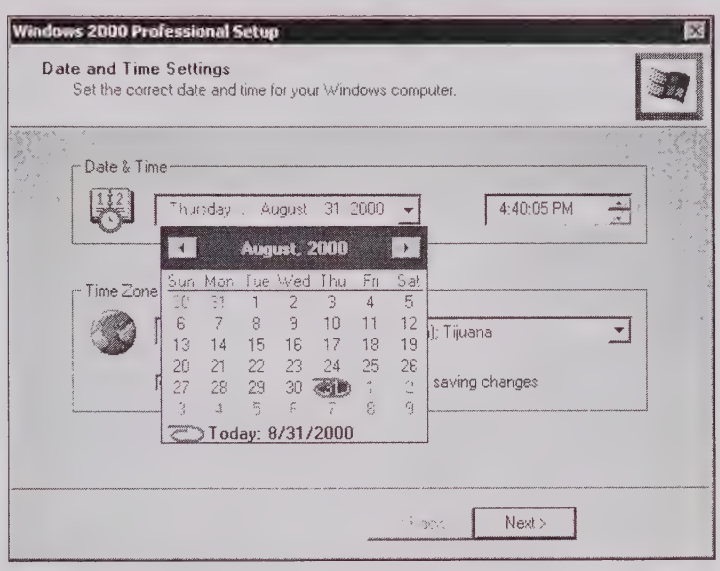

Windows 2000 Professional Setup
Computer Name and Administrator Password
You must provide a name and an Administrator password for your computer.
Setup has suggested a name for your computer. If your computer is on a network, your network administrator can tell you what name to use.
Computer name:
PNA-SERIES-NETWORK-ANALYZER
Setup creates a user account called Administrator. You use this account when you need full access to your computer
Type an Administrator password
Administrator password:
Confirm password:
< Back
Next >

**6.** Enter an administrator password in the **Administrator password** box. Retype the password in the **Confirm password** box. Then, click **Next**.

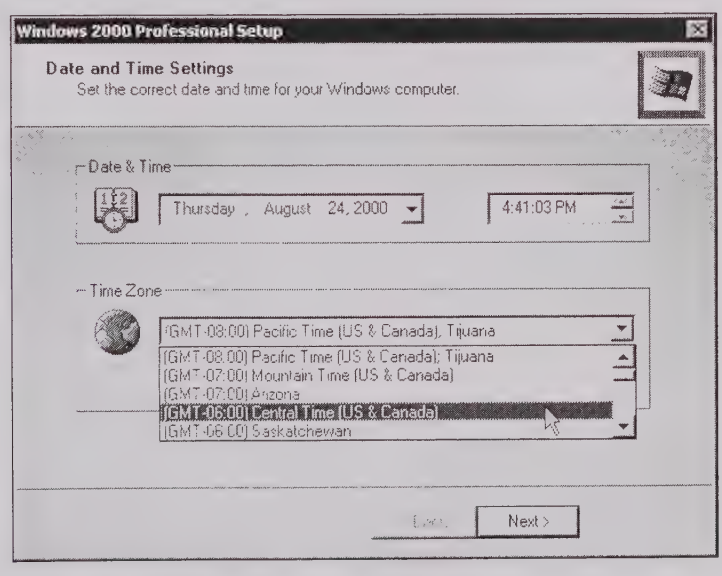

Windows 2000 Professional Setup
Computer Name and Administrator Password
You must provide a name and an Administrator password for your computer.
Setup has suggested a name for your computer. If your computer is on a network, your network administrator can tell you what name to use.
Computer name:
PNA-SERIES-NETWORK-ANALYZER
Setup creates a user account called Administrator. You use this account when you need full access to your computer
Type an Administrator password.
Administrator password:
Confirm password:
< Back
Next >

**CAUTION** It is ***extremely*** important that you remember the administrator password. If your security program allows, record the password and store it in a safe place. Without the password, you will be prevented from accessing several features within the analyzer.

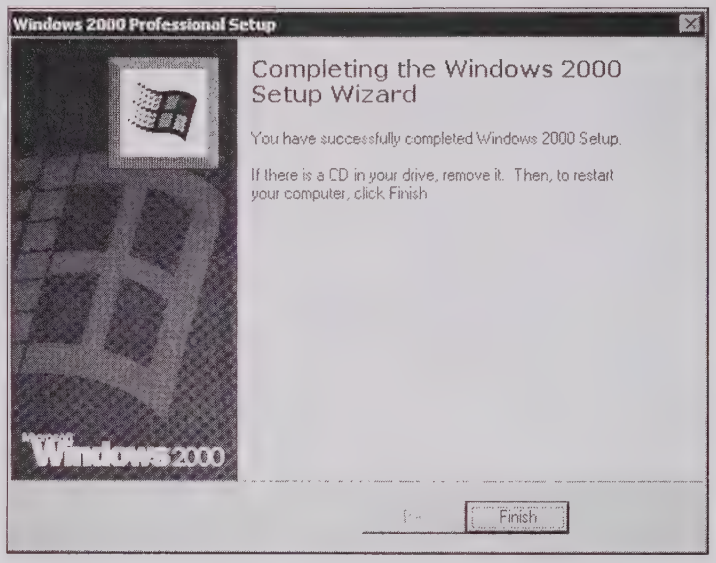
**7.** If the displayed date is incorrect, click the **Date** entry to display a calendar. Select the correct date from the calendar. If the displayed time is incorrect, click the **Time** (hours, minutes, seconds, or AM/PM) entries and then type in the correct time or click the arrows to select the correct time.



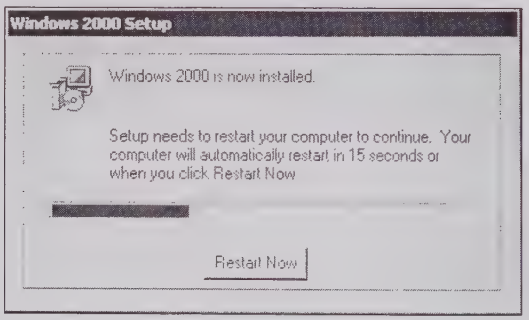

**8.** In the **Time Zone** list, click your local time zone. If your location observes daylight savings time, click the **Automatically adjust clock for daylight saving changes** box to make the time change automatically. Then, click **Next**.


Windows 2000 Professional Setup
Date and Time Settings
Set the correct date and time for your Windows computer.
Date & Time
Thursday , August 24, 2000
4:41:03 PM
Time Zone
(GMT-08:00) Pacific Time (US & Canada); Tijuana
(GMT-08:00) Pacific Time (US & Canada); Tijuana
(GMT-07:00) Mountain Time (US & Canada)
(GMT-07:00) Arizona
(GMT-06:00) Central Time (US & Canada)
(GMT-06:00) Saskatchewan
Next >

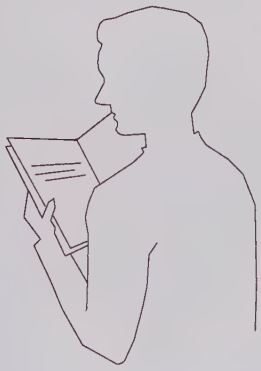
**9.** Click **Finish** to end the Completing Windows 2000 Setup Wizard.


Windows 2000 Professional Setup
Completing the Windows 2000 Setup Wizard
You have successfully completed Windows 2000 Setup.
If there is a CD in your drive, remove it. Then, to restart your computer, click Finish
Finish

**10.** Click **Restart Now** to restart the network analyzer. The analyzer will open in the network analyzer application. This process will take several minutes.


Windows 2000 Setup
Windows 2000 is now installed.
Setup needs to restart your computer to continue. Your computer will automatically restart in 15 seconds or when you click Restart Now
Restart Now

**11.** Continue with "STEP 6. Perform Additional Administrative Tasks" on page 1-30.



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# STEP 6. Perform Additional Administrative Tasks

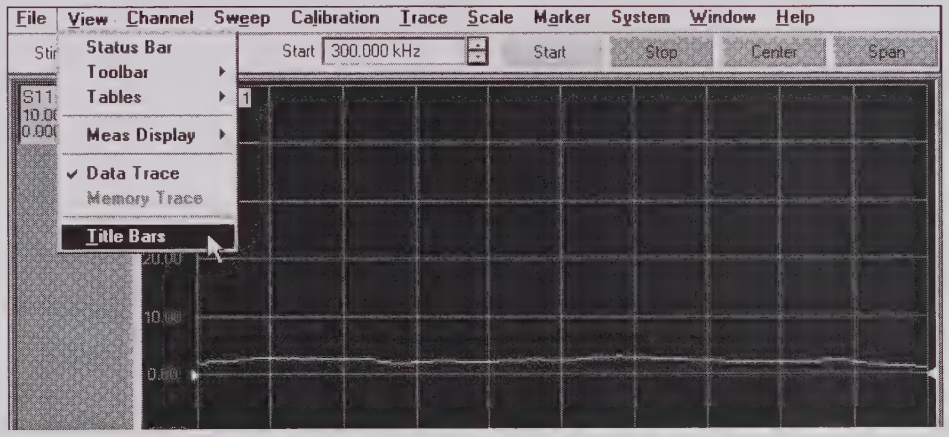
This section will guide you through the following tasks.

- Creating an emergency repair disk.
  Refer to "To Create an Emergency Repair Disk" on page 1-31.
- Setting up additional network analyzer users.
  Refer to "To Set Up Additional Network Analyzer Users" on page 1-37.

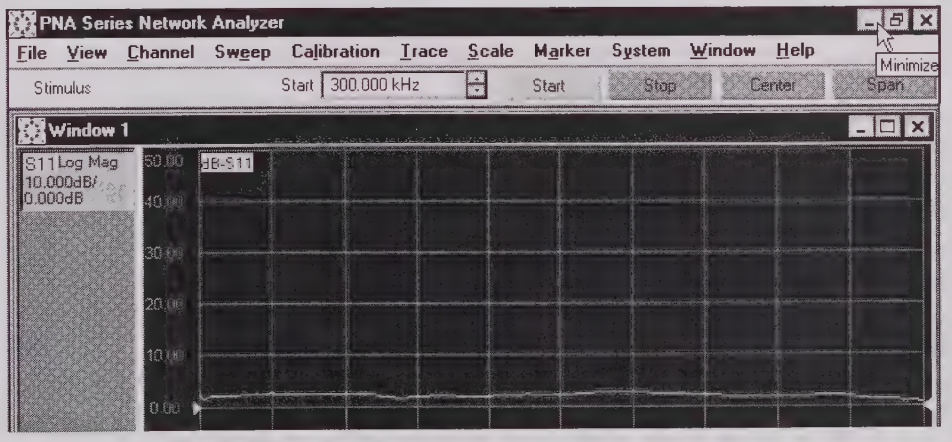
## To Create an Emergency Repair Disk

An Emergency Repair Disk (ERD) will help you recover if the hard disk in your analyzer is damaged. You need a blank, formatted 3.5-inch floppy disk to create an ERD.

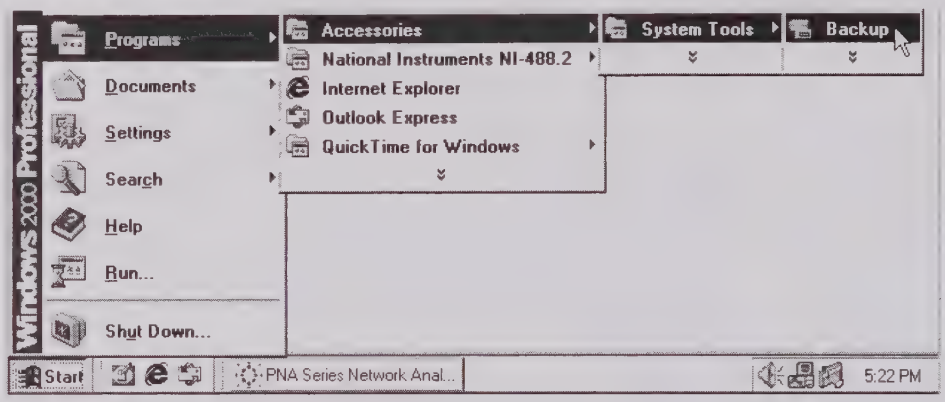
**1.** On the **View** menu, click **Title Bars** to display the title bar.



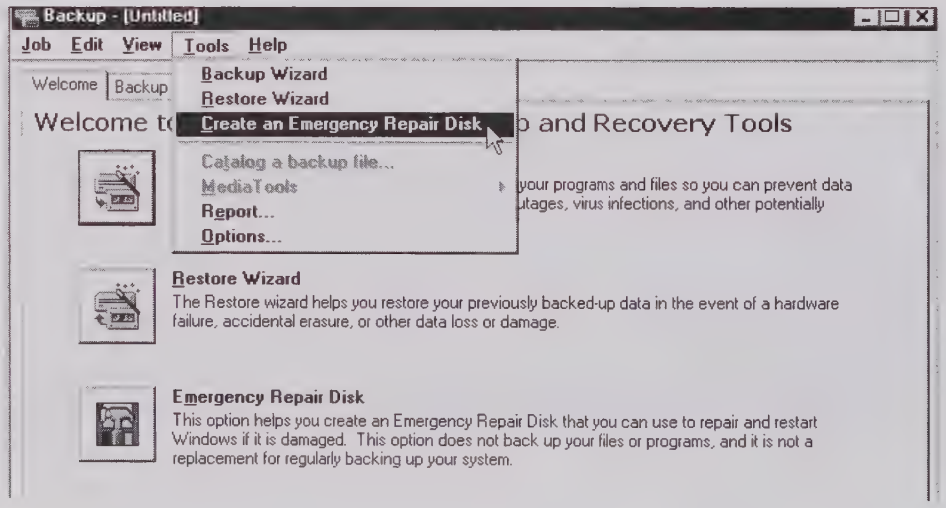

**2.** Click **Minimize** to minimize the network analyzer application.



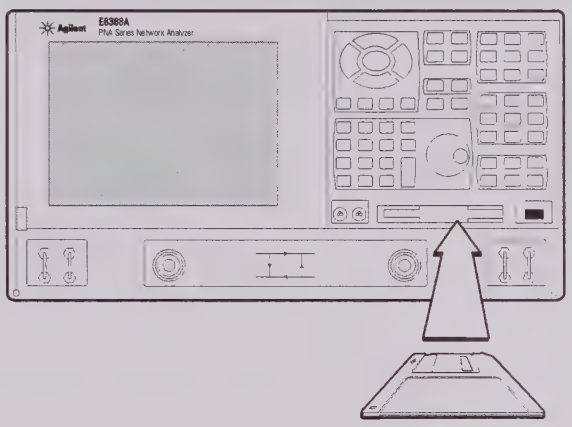
**3.** Click **Start**, then point to **Programs**, **Accessories**, **System Tools**, and click **Backup** to open the Backup window.




**4.** On the **Tools** menu, click **Create an Emergency Repair Disk**.

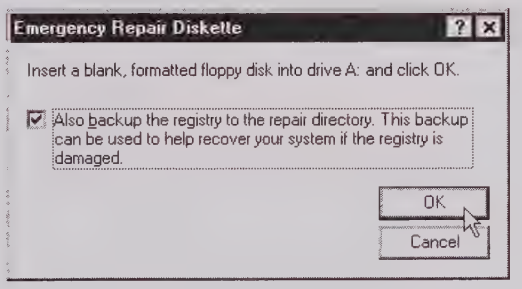

Backup - [Untitled]
Job Edit View Tools Help
Welcome Backup
Backup Wizard
Restore Wizard
Create an Emergency Repair Disk
Catalog a backup file...
MediaTools
Report...
Options...
and Recovery Tools
your programs and files so you can prevent data
utages, virus infections, and other potentially
Restore Wizard
The Restore wizard helps you restore your previously backed-up data in the event of a hardware failure, accidental erasure, or other data loss or damage.
Emergency Repair Disk
This option helps you create an Emergency Repair Disk that you can use to repair and restart Windows if it is damaged. This option does not back up your files or programs, and it is not a replacement for regularly backing up your system.

**5.** When prompted, insert a blank, formatted floppy disk into the analyzer's front panel disk drive.

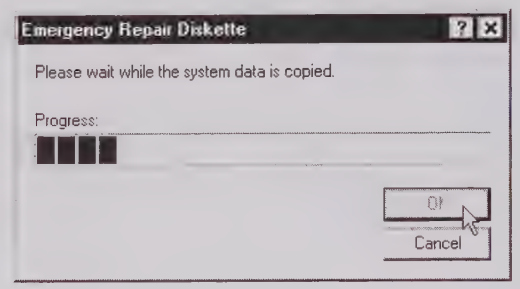



jc842a

**6.** Click the **Also backup the registry to the repair directory** box. Then, click **OK**.


Emergency Repair Diskette
Insert a blank, formatted floppy disk into drive A: and click OK.
Also backup the registry to the repair directory. This backup can be used to help recover your system if the registry is damaged.
OK
Cancel

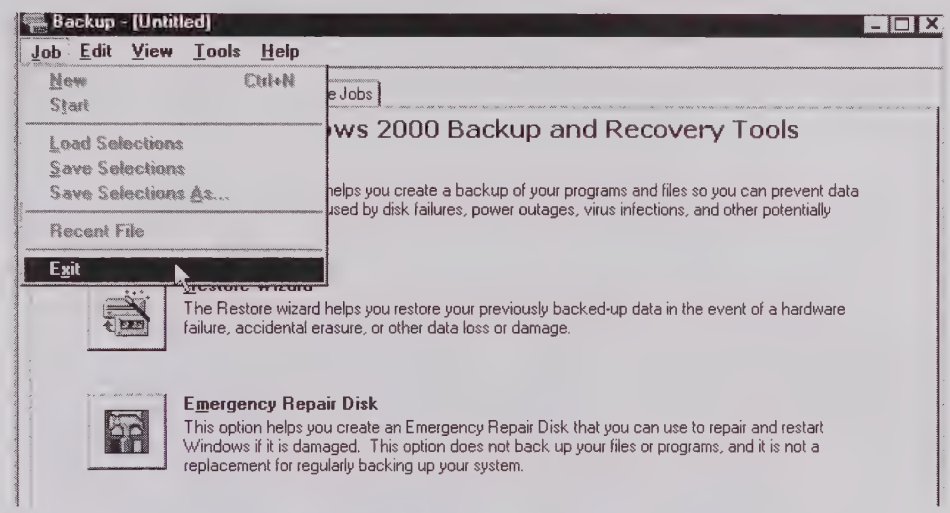
**7.** Follow the on-screen directions to finish creating the ERD.



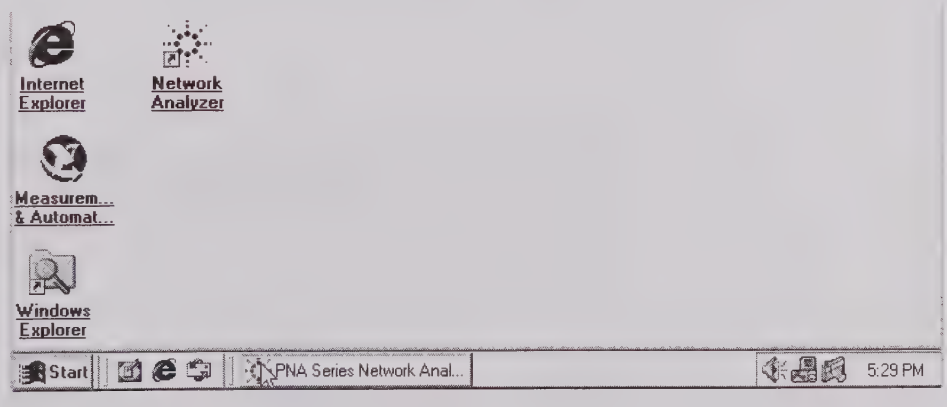

**8.** Remove the ERD from the disk drive. Label and store the disk. Then, click **OK**.

Emergency Repair Diskette
The emergency repair diskette was saved successfully.
Please label the diskette "Emergency Repair Disk" and note the current date. Place it in a safe location in case it is needed at a later date.
OK
Cancel

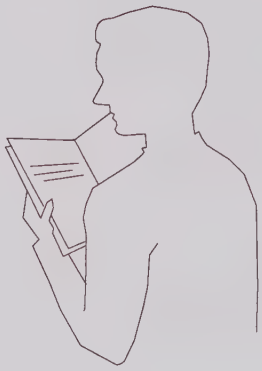
**9.** On the **Job** menu, click **Exit** to close the Backup window.


Backup - [Untitled]
Job Edit View Tools Help
New Ctrl+N
Start
Load Selections
Save Selections
Save Selections As...
Recent File
Exit
e Jobs
ws 2000 Backup and Recovery Tools
helps you create a backup of your programs and files so you can prevent data
used by disk failures, power outages, virus infections, and other potentially
The Restore wizard helps you restore your previously backed-up data in the event of a hardware failure, accidental erasure, or other data loss or damage.
Emergency Repair Disk
This option helps you create an Emergency Repair Disk that you can use to repair and restart Windows if it is damaged. This option does not back up your files or programs, and it is not a replacement for regularly backing up your system.

**10.** Click the **PNA Series Network Analyzer** taskbar button on the taskbar at the bottom of the display to restore the network analyzer application.



**11.** If you want to set up the network analyzer to be used by other co-workers, continue with "To Set Up Additional Network Analyzer Users" on page 1-37. If you are the only person that will be using the network analyzer, continue with "STEP 7. Run the Operator's Check" on page 1-45.



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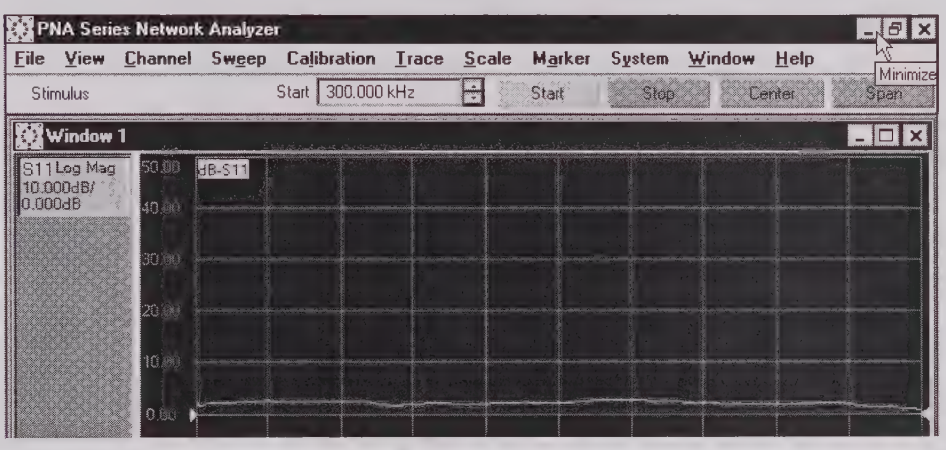
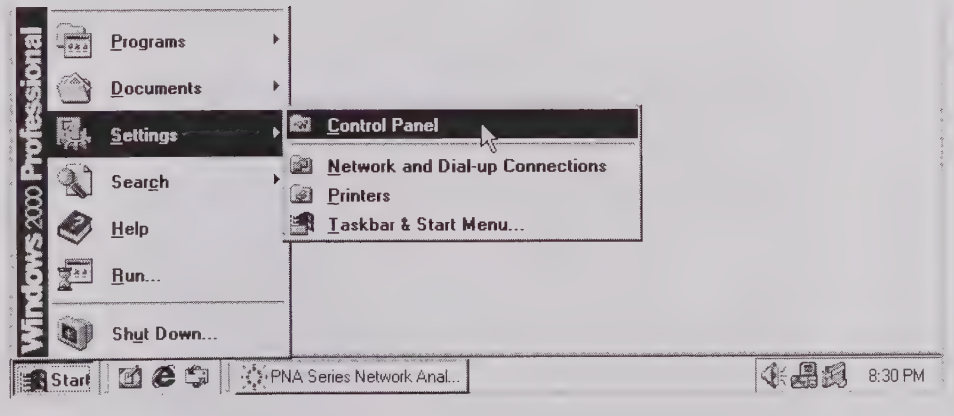
## To Set Up Additional Network Analyzer Users

As the administrator of the network analyzer, you can set the analyzer to allow others to use it with reduced permissions. That is, other people can be signed on to use the analyzer but they will not have the ability to perform all of the administrative functions that you can as the administrator.

**1.** Click **Minimize** to minimize the network analyzer application.

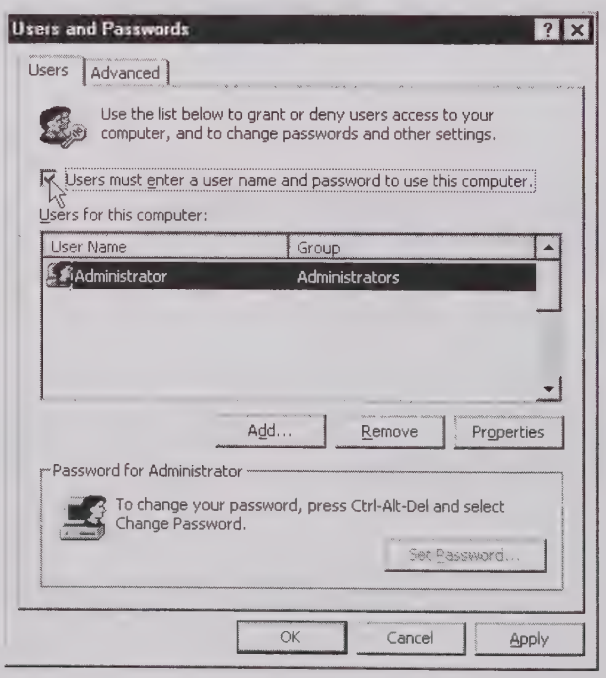



**2.** Click **Start**, point to **Settings**, and then click **Control Panel**.

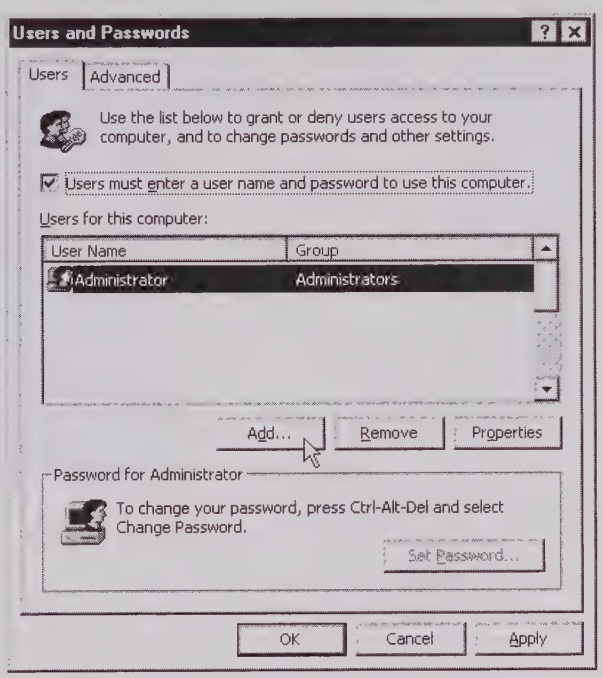


**3.** In the **Control Panel** window, scroll down and select the **Users and Passwords** application.

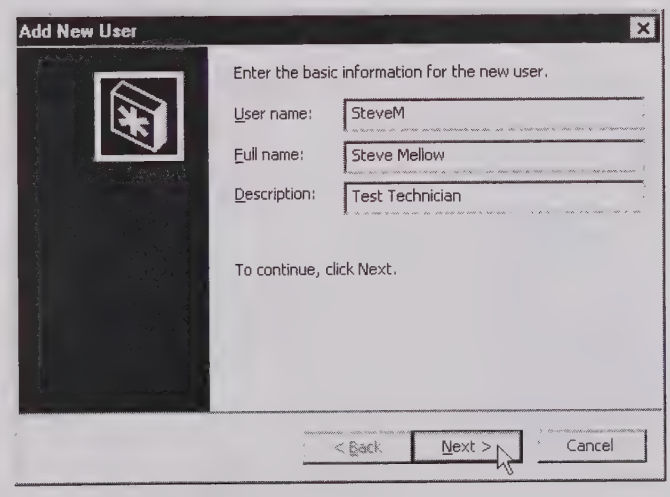
**4.** On the **Users** tab, if the **Add** button appears dimmed, select the **Users must enter a user name and password to use this computer** check box near the top of the window.



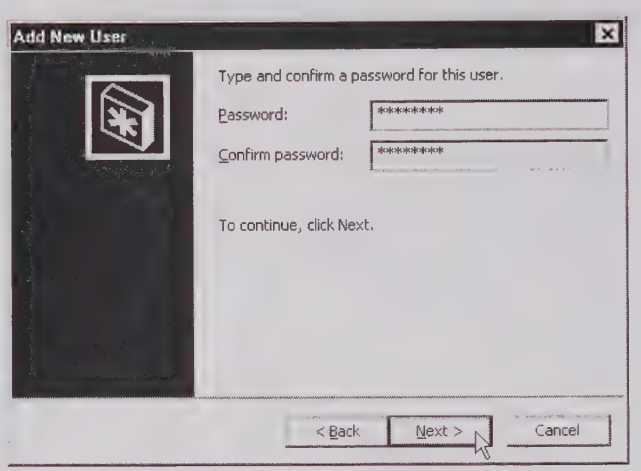
**5.** Click **Add** to enter the information for the new user.




**6.** In the **User name** box, enter a user name for the new user. In the **Full name** box, enter the full name of the new user. In the **Description** box, enter a description for the new user. Then, click **Next**.



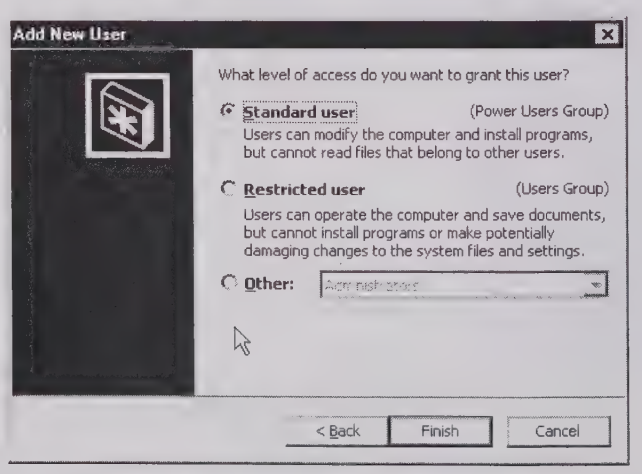
**7.** In the **Password box**, have the new user type a password. Have the new user retype the password in the **Confirm password** box. Then, click **Next**.



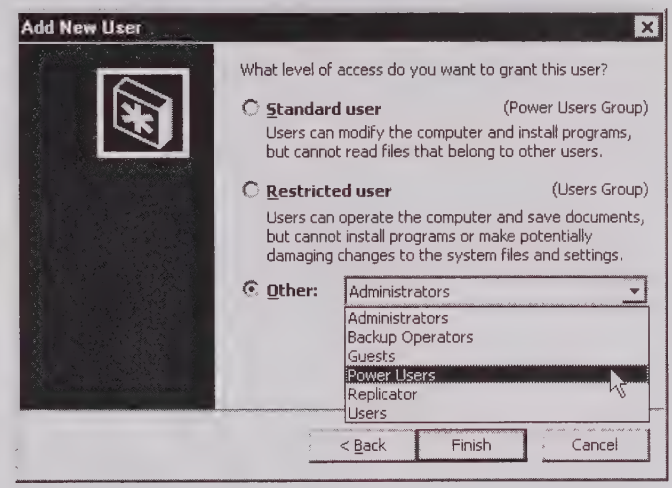

**8.** Consider the level of access that you wish to grant this new user.

Levels of access not listed on the **Add New Users** window are:

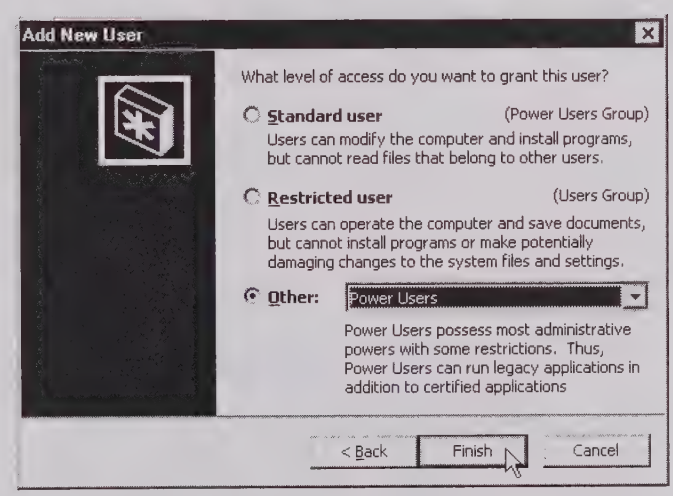
| | |
|---|---|
| **Administrators:** | have complete and unrestricted access to the computer/domain |
| **Backup Users:** | can override security restrictions for the sole purpose of backing up or restoring files |
| **Guests:** | have the same access as members of the Users group by default, except for the Guest account which is further restricted |
| **Power Users:** | possess most administrative powers with some restrictions. Thus, Power Users can run legacy applications in addition to certified applications |
| **Replicators:** | support file replication in a domain |
| **Users:** | are prevented from making accidental or intentional system-wide changes. Thus, Users can run certified applications, but not most legacy |


Add New User
What level of access do you want to grant this user?
Standard user
(Power Users Group)
Users can modify the computer and install programs, but cannot read files that belong to other users.
Restricted user
(Users Group)
Users can operate the computer and save documents, but cannot install programs or make potentially damaging changes to the system files and settings.
Other:
< Back
Finish
Cancel

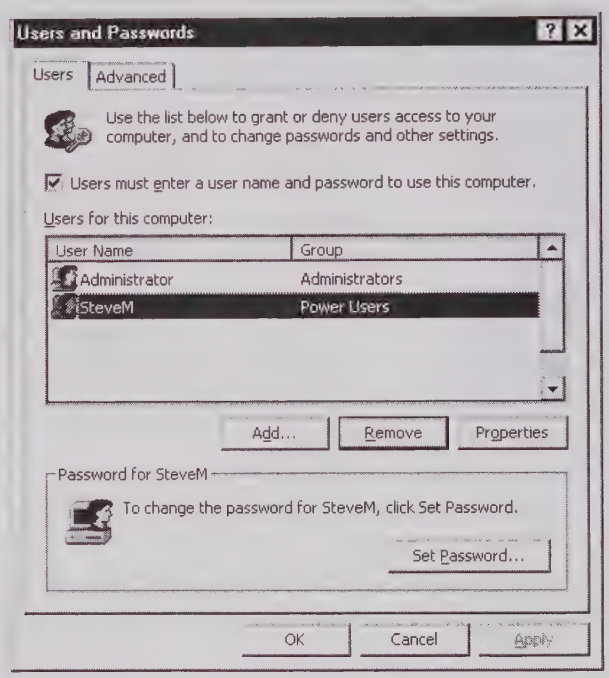
**9.** The two standard selections are **Standard user** and **Restricted user**. There are several other levels of security that you may grant in the **Other** list. A description of each of these other levels is displayed beneath the **Other** box when it is selected.


Add New User
What level of access do you want to grant this user?
Standard user (Power Users Group)
Users can modify the computer and install programs, but cannot read files that belong to other users.
Restricted user (Users Group)
Users can operate the computer and save documents, but cannot install programs or make potentially damaging changes to the system files and settings.
Other:
Administrators
Administrators
Backup Operators
Guests
Power Users
Replicator
Users
< Back
Finish
Cancel

**10.** Select the level of access that you wish to grant this new user. Then, click **Finish**.

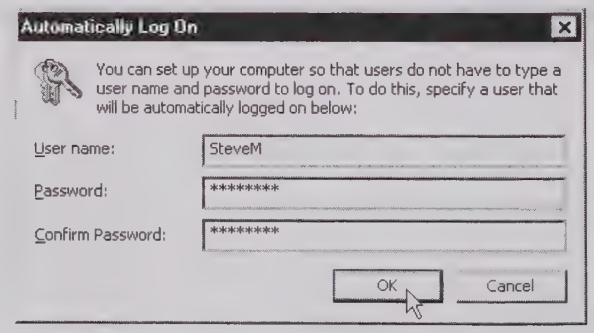

Add New User
What level of access do you want to grant this user?
Standard user (Power Users Group)
Users can modify the computer and install programs, but cannot read files that belong to other users.
Restricted user (Users Group)
Users can operate the computer and save documents, but cannot install programs or make potentially damaging changes to the system files and settings.
Other:
Power Users
Power Users possess most administrative powers with some restrictions. Thus, Power Users can run legacy applications in addition to certified applications
< Back
Finish
Cancel

**11.** In the Users and Passwords window, validate the user name and security level group of the new user displayed in the Users for the computer list.

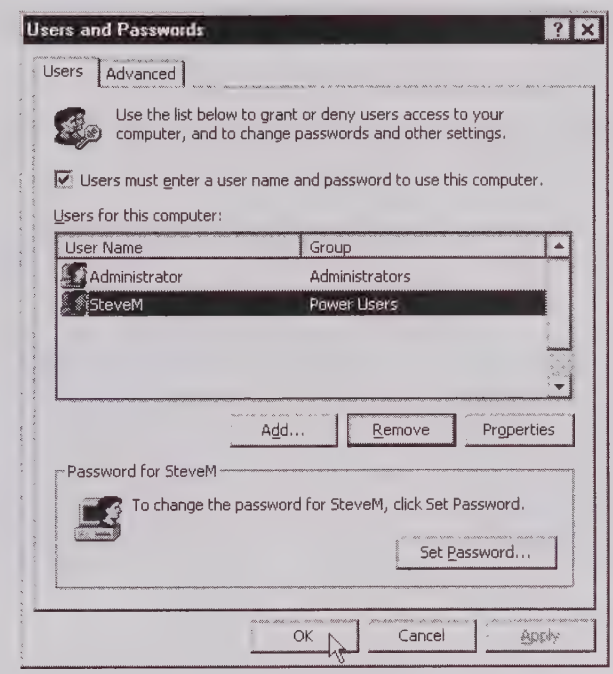



**12.** If you want this user to be able to use the network analyzer without entering their password each use, clear the **Users must enter a user name and password to use this computer** check box in the Users and Passwords window (in the previous illustration). (If the **Users must enter a user name and password to use this computer** check box is checked, the **Automatically Log On** window is not displayed.)

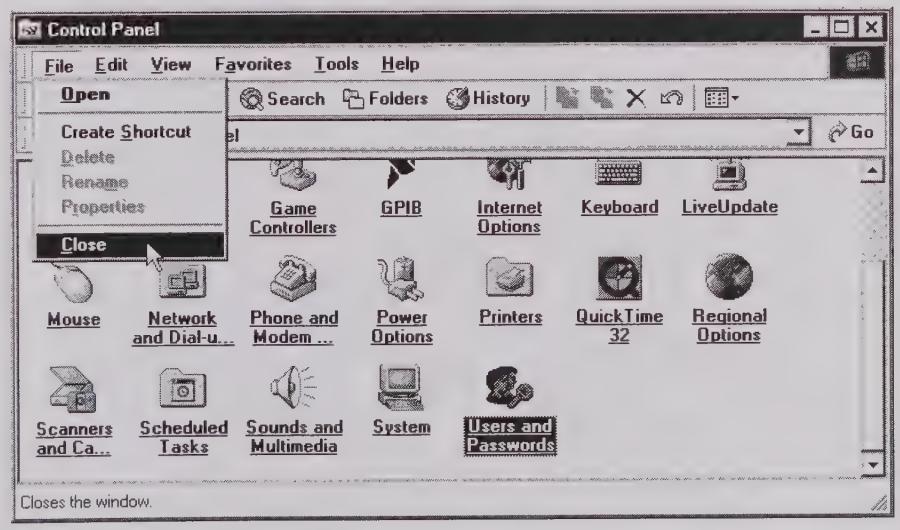
When the **Automatically Log On** window is displayed, have the new user type their password in the **Password** box and have them retype the password in the **Confirm Password** box. Then, click **OK**.


Automatically Log On
You can set up your computer so that users do not have to type a user name and password to log on. To do this, specify a user that will be automatically logged on below:
User name:
SteveM
Password:
*********
Confirm Password:
*********
OK
Cancel

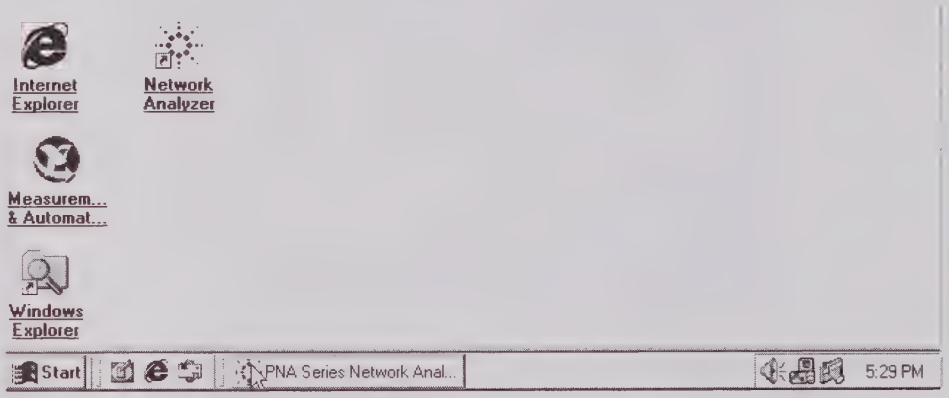
**13.** Click **OK** to complete this new user addition.



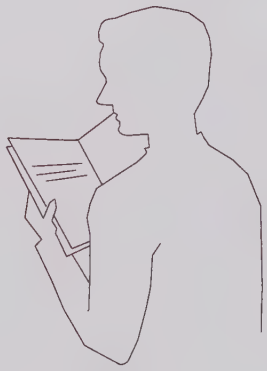

**14.** From the **File** menu, click **Close** to close the Control Panel.



**15.** Click the PNA Series Network Analyzer taskbar button on the taskbar at the bottom of the display to restore the network analyzer application.




**16.** Continue with "STEP 7. Run the Operator's Check" on page 1-45.



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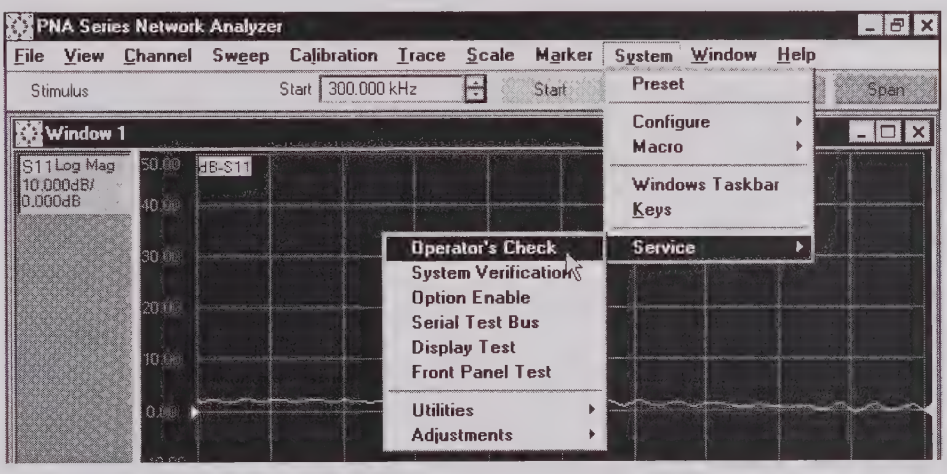
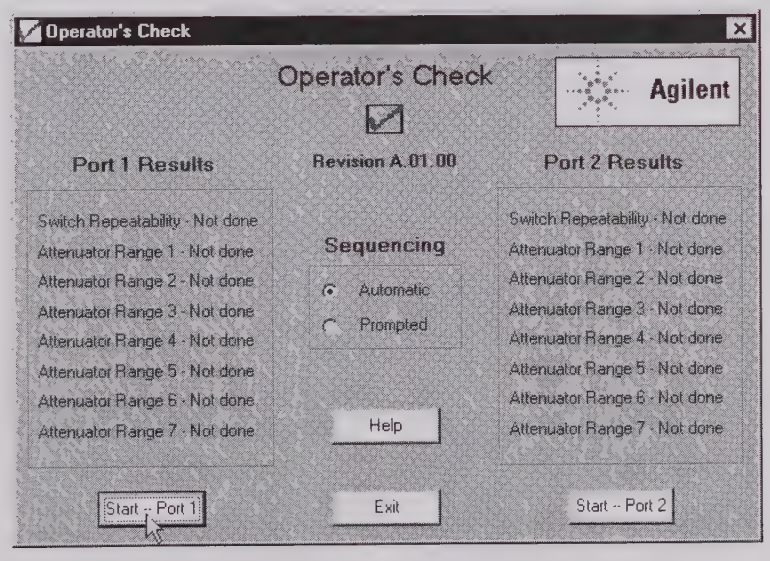
# STEP 7. Run the Operator's Check

**1.** On the **System** menu, point to **Service**, and then click **Operator's Check**.

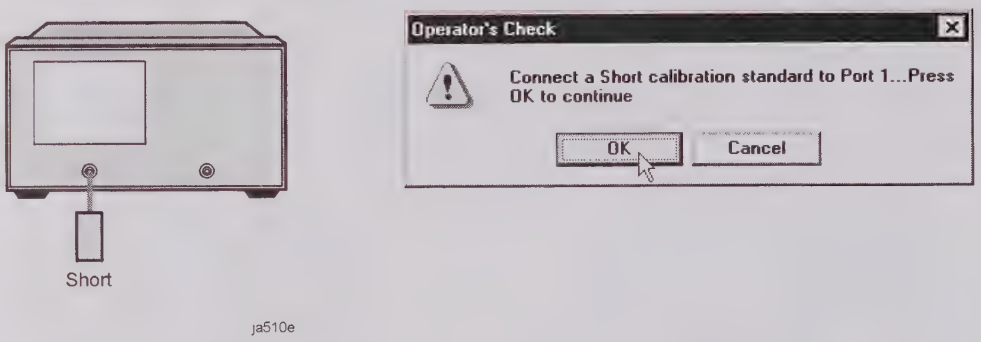



**2.** In the Operator's Check window, click **Start -- Port 1**.

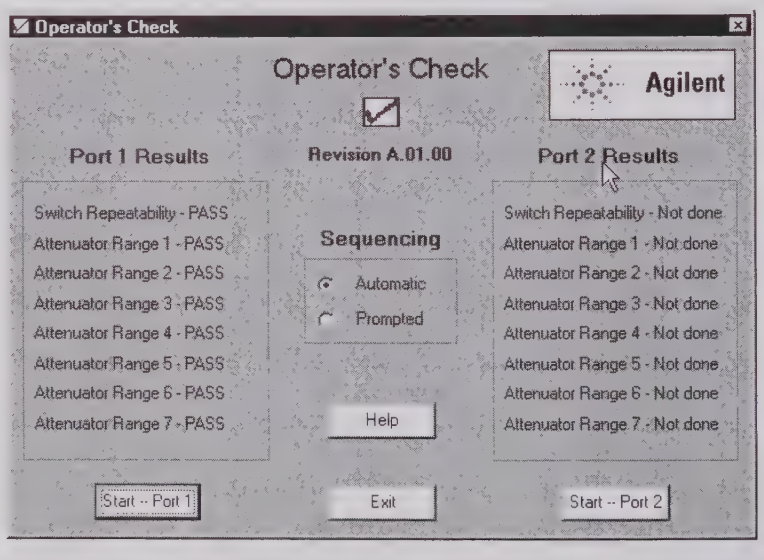


**3.** When prompted, connect a short from your calibration kit to test port 1. Then, click **OK** to start the automated check.

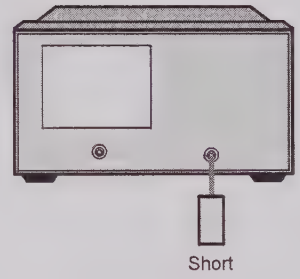
The calibration kit is neither a standard nor an option to you network analyzer. It is a separate Agilent product that is used to calibrate your network analyzer. If you do not have a calibration kit for your network analyzer, contact your nearest Agilent sales or service office. Refer to Table 5-1 on page 5-4 for a list of sales and service offices.

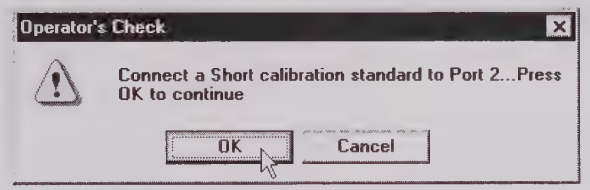



**4.** After the operator's check on test port 1 is complete, click **Start -- Port 2** to start the operator's check on test port 2.



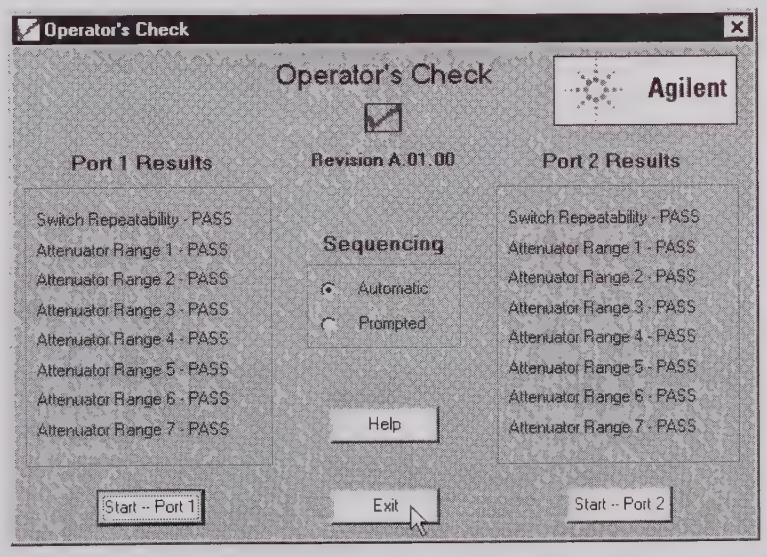
**5.** When prompted, move the short from test port 1 to test port 2. Then, click **OK** to start the automated check on test port 2.




**6.** After the operator's check on test port 2 is complete and the Operator's Check window is displayed, note the operator's check results on test ports 1 and 2.

- If the operator's check passed all of the checks, click **Exit** to complete the operator's check and return to the network analyzer measurement window. Now, you are ready to make a measurement. Continue with Chapter 3 , "Getting Started with Measurements."
- If the operator's check failed any check, contact your nearest Agilent sales or service office. Refer to Table 5-1 on page 5-4 for a list of sales and service offices.



# 2 Becoming Familiar with Your Analyzer

This chapter describes the features of the network analyzer that you will use to make measurements. Each front panel and rear panel feature is described. This is a list of the front panel and rear panel features.

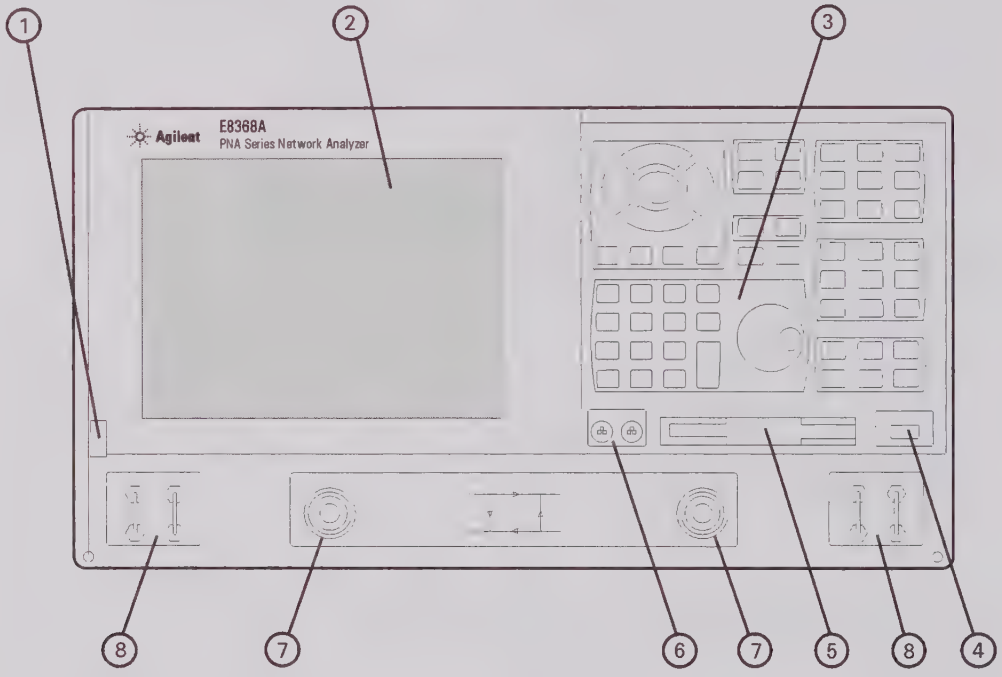
- Front Panel
  - ❑ On/Off Switch
  - ❑ Display
  - ❑ Keypad
  - ❑ USB Connector
  - ❑ 3.5-inch Floppy Disk Drive
  - ❑ Probe Power Connector
  - ❑ Test Ports
  - ❑ Auxiliary Output Connectors
- Display
  - ❑ Menu Titles
  - ❑ Window Control Buttons
  - ❑ Active Entry Toolbar
  - ❑ Measurement Toolbar
  - ❑ Sweep Control Toolbar
  - ❑ Stimulus Toolbar
  - ❑ Marker Toolbar
  - ❑ Trace Bar
  - ❑ Screen Grid
  - ❑ Tables
- Keypad
  - ❑ **Navigation** keys
    *Keys include:* Left Arrow, Right Arrow, Up Arrow, Down Arrow, Click, F1, F2, F3, and F4
  - ❑ **Display** keys
    *Keys include:* Trace, Window, Measure Setups, and Arrange
  - ❑ **Channel Setup** keys
    *Keys include:* Start/Center, Stop/Span, Power, Sweep Setup, Channel, Sweep Type, Trigger, Average, and Cal
  - ❑ **Command** keys
    *Keys include:* OK, Help, Cancel, and Menu/Dialog
  - ❑ **Trace Setup** keys
    *Keys include:* Measure, Format, Scale, Marker, Marker Table, Limit Table, Marker Search, Marker Function, and Math/Memory
  - ❑ **Entry** keys
    *Keys include:* 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, G/n, M/u, Enter, +/– ⇐, and .
    *Front panel knob also included*
  - ❑ **Utility** keys
    *Keys include:* Save, Restore Up / Down, Preset, Recall, Print, and Macro/Local

- Rear Panel
  - ❑ Top Assemblies Rear Panel Interconnects
    - — External Detector Input Connector
    - — External AM Input Connector
    - — 10 MHz Reference Output Connector
    - — 10 MHz Reference Input Connector
    - — AC Input
  - ❑ CPU Board Rear Panel Interconnects
    - — General Purpose Interface Bus (GPIB) Connector
    - — Universal Serial Bus (USB) Connector
    - — Parallel Interlace Port Connector
    - — Serial Interface Port (COM1) Connector
    - — Video Graphics Adapter (VGA) Output Connector
    - — Local Area Network (LAN) Connector
  - ❑ Test Set Motherboard Rear Panel Interconnects
    - — Auxiliary I/O Connector
    - — Test Port 1 Bias Input Connector
    - — Test Port 1 Bias Input Fuse
    - — Test Port 2 Bias Input Connector
    - — Test Port 2 Bias Input Fuse

# Front Panel

The network analyzer front panel has several features with which to become familiar. Refer to Figure 2-1 for an illustration of the front panel. This illustration is followed by the name and description of each feature. The display and keypad features are described in greater detail in subsequent sections of this chapter.

**Figure 2-1 Front Panel**




Refer to Figure 2-1 when identifying each of the following front panel features:

1. **On/Off Switch**
   The On/Off switch toggles the analyzer between the On and Hibernate conditions. For the On condition the button is green. For the Hibernate condition, the button is an yellow light.

   To switch off the analyzer, press the power button and the instrument saves the states of all the programs running and switches off the power. When you press the button again, the instrument loads the states that were saved at the time the power was switched off.

   The front panel switch is only a standby switch and is not a LINE switch (disconnecting device). Refer to the note describing Turning Off the Network Analyzer on page 1-23 for additional information.

2. **Display**
   The display features are discussed in detail in the section entitled "Display" on page 2-6.

3. **Keypad**
   The keypad is used as an interface to set up the network analyzer. The keypad features are discussed in detail in the section entitled "Keypad" on page 2-8.

4. **USB Connector**
   The Universal Serial Bus (USB) allows you to control the analyzer using a mouse, keyboard, or other pointing devices. This connector can also accommodates electronic calibration modules. It can provide a maximum current of 0.5A.

5. **3.5-inch Floppy Disk Drive**
   Installs files on the analyzer hard drive or stores data files from the analyzer. Access this disk drive by using NT Explorer. The disk drive has an unformatted data capacity of 2MB and is compatible with high density (2HD) and normal density (2DD) disks.

6. **Probe Power Connector**
   These connectors supply power for active probes. For the voltage specifications of these connectors, refer to the specifications in the embedded Help system.

7. **Test Ports**
   These 50-ohm, type-N (female) ports that can be switched between the analyzer RF source and receiver, to allow measurements of the device under test in two directions.

   A green light around the port, indicates the source output port. An orange light around the port, indicates the receiver input port.

   These test ports have the following input damage levels:
   - CW Level: +15 dBm
   - DC Voltage Level: ±30 V

8. **Auxiliary Output Connectors**
   These connectors are used to develop custom measurements. Refer to the troubleshooting chapter in the PNA series network analyzer service guide for the block diagram of internal hardware for details.

   ### Port 1
   The Port 1 connectors are labeled A and R1. The A output connector is connected to the coupled arm of the Port 1 coupler. The A input connector is connected directly to the input of receiver A. If Option 015 (configurable test set option) is installed, the path is connected directly to a variable attenuator and then to the receiver's input.

   The R1 output connector is connected to the transfer switch Reference 1 output. The R1 input connector is connected directly to the R1 receiver input.

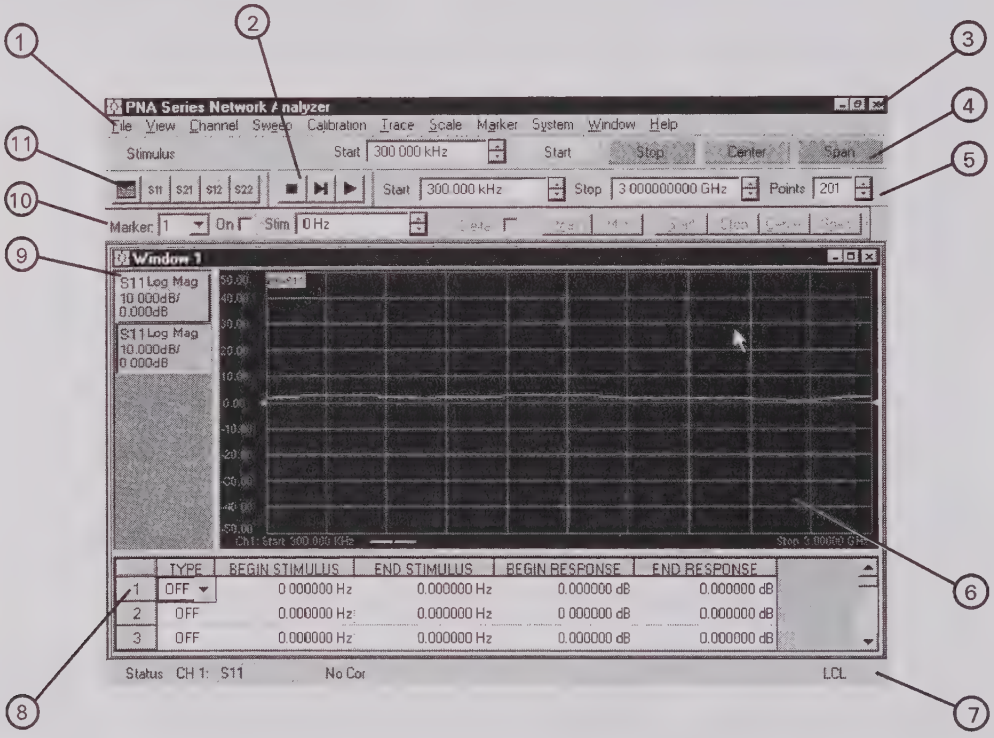
   ### Port 2
   The Port 2 connectors are labeled B and R2. The B output connector is connected to the coupled arm of the Port 2 coupler. The B input connector is connected directly to the input of receiver B. If Option 015 (configurable test set option) is installed, the path is connected directly to a variable attenuator and then to the receiver's input.

   The R2 output connector is connected to the transfer switch Reference 2 output. The R2 input connector is connected directly to the R2 receiver input.

# Display

The network analyzer display has several features with which to become familiar. Refer to Figure 2-2 for an illustration of the display. This illustration is followed by the name and description of each feature.

**Figure 2-2 Display**




Refer to Figure 2-2 when identifying each of the following display features:

1. **Menu Titles**
   Allows you to access the drop-down menus, revealing the analyzer functions.

2. **Sweep Control Toolbar**
   Allows you to stop the current measurement sweep ( ■ ), make a single measurement sweep ( ▶| ), or make measurement sweeps continuously ( ▶ ).

3. **Window Control Buttons**
   Allows you to minimize, enlarge and reduce, and close the network analyzer application and the window that is part of the application.

4. **Active Entry Toolbar**
   Allows you to choose from the functions available when you press a front panel key.

5. **Stimulus Toolbar**
   Allows you to change values for the stimulus settings by selecting start and stop frequencies and the number of points.

6. **Screen Grid (Graticule)**
   Allows you to view the measurement traces. You can view up to four windows on the analyzer screen. You can view up to four measurement traces and four memory traces in each window.

7. **Status Bar**
   Allows you to view current network analyzer information. The information that is included on the bar includes the active channel, the selected measurement, whether measurement correction is being applied, and whether the analyzer is in local or remote mode. If sweep averaging, smoothing, transform, gating, and electrical delay is on, this information is also displayed on the bar.

8. **Tables**
   Allows you to alternately view the marker data, the settings for a segment sweep, or the settings for a limit test.

9. **Trace Bar**
   Allows you to select an active measurement trace, using a mouse or other pointing device. A measurement must be active to modify any settings associated with it.

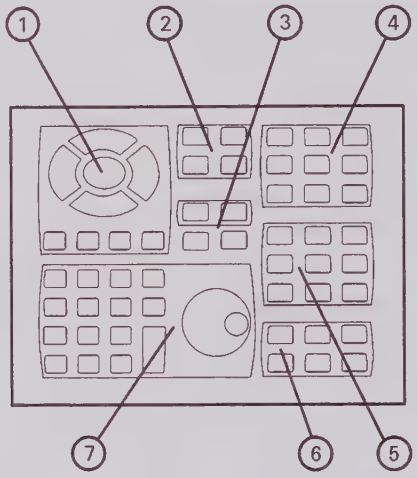
10. **Marker Toolbar**
    Allows you to assign markers to a stimulus value, use markers to search for specified values, and set stimulus values based on a marker location.

11. **Measurement Toolbar**
    Allows you to add an S-parameter measurement. The measurement appears in the active window and the settings of the active channels apply.

# Keypad

The network analyzer keypad has several features with which to become familiar. Refer to Figure 2-3 for an illustration of the keypad. This illustration is followed by the name and description of each feature.

**Figure 2-3 Keypad**




Refer to Figure 2-3 when identifying each of the following keypad features:

1. **Navigation** keys allow you to select choices from the active entry toolbar and navigate through menus and dialog boxes.

   **Left Tab** / **Right Tab** keys
   - Moves the cursor left and right through menus.
   - Moves the cursor tab-left and tab-right within dialog boxes.

   **Up Arrow** / **Down Arrow** keys
   - Move the cursor up and down through menus.
   - In a dialog box:
     — Modify a numeric value.
     — Move through items in a drop-down list.
     — Move through options buttons in a group of option buttons.

   **Click** key makes a selection just like a mouse click.

   **F1**, **F2**, **F3**, **F4** keys select choices from the active entry toolbar. The color of the key corresponds to the active entry toolbar choice.

2. **Display** keys allow you to manage and create traces and windows, quickly configure a set of measurements, and arrange the display of current measurements.

   **Trace** key, when first pressed, allows you to cycle through the traces in a window, making each trace active in turn. You can make modifications only to the active trace. This key also allows you to create or delete traces using the active entry toolbar.

   **Window** key allows you to cycle through the windows that are currently setup, making each window active in turn. You can make size modifications only to an active window. A window must also be active to cycle through the traces in the window. This key also allows you to create or delete windows.

   **Measure Setups** key allows you choose from four preconfigured measurement setups.

   **Arrange** key allows you to choose from four window arrangements: Overlay, Stack 2, Split 3, Quad 4.

3. **Command** keys allow you to issue commands in a dialog box, display menus or dialog boxes, and start the analyzer embedded Help system.

   **OK** key closes a dialog box and enters any values made in the dialog box.

   **Help** key launches the analyzer Help (embedded documentation) system.

   **Cancel** key closes a dialog box.

   **Menu / Dialog** key allows you to browse the menus with the Navigation keys.

4. **Channel Setup** keys allow you to configure a channel with various stimulus settings and perform a measurement calibration.

   **Start / Center** key allows you to enter a value for the start or center of a measurement range.

   **Stop / Span** key allows you to enter a value for the stop or span of the measurement range.

   **Power** key allows you to specify the source power level.

   **Sweep Setup** key allows you to define how the analyzer source provides a stimulus to a device under test.

   **Channel** key allows you to select an active channel, or delete a channel. A channel must be active to modify any channel settings.

   **Sweep Type** key allows you to select the way the analyzer source sweeps and the properties associated with the sweep.

   **Trigger** key allows you to specify how the start of the measurement sweep is initiated.

   **Average** key allows you to apply measurement averages which reduces noise. The analyzer performs a complex exponential average of a number of sweeps that you specify.

   **Cal** (Calibration) key initiates a measurement calibration. Pressing **Menu / Dialog**, **Cal** displays the Calibration Wizard. Otherwise, pressing **Cal** displays the calibration active entry toolbar.

5. **Trace Setup** keys allow you to configure a measurement type and extract data from the results.

   **Measure** key allows you to select an S-parameter measurement. Through the dialog box, you can also select an arbitrary ratio or unratioed power measurement.

   **Format** key allows you to select the format the analyzer uses to display the measurement data.

   **Scale** key allows you to specify the value the analyzer uses to scale the displayed measurement response. You can also let the analyzer automatically set the Y-axis scales to fit the entire measurement trace on the screen.

   **Marker** key allows you to activate a marker and set the value. Markers provide numerical readout of measured data.

   **Marker Table** key displays the marker table, showing the data readout for all of the markers on the active trace.

   **Limit Table** key displays the table of values that allow you to create pass/fail testing based on these limit segments.

   **Marker Search** key presents access to the marker search functions. If there is no marker displayed, this key will activate a marker.

   **Marker Function** key allows you to change measurement settings, based on the location of an active marker. If there is no marker displayed, this key will activate a marker.

   **Math / Memory** key allows you to select trace math and memory functions that the analyzer performs on the measurement data.

6. **Utility** keys allow you to print measurement results, preset the analyzer, run macros, manipulate the window size, and save and recall the following: 1) instrument states, 2) measurement calibrations, and 3) measurement data.

   **Save** key allows you to save instrument states, calibration data, and measurement data to a file.

   **Restore Up / Down** key changes the selected window to the full measurement screen size and then restores it to the previous window size.

   **Preset** key changes the analyzer to its preset (default) conditions.

   **Recall** key allows you to recall a file that may contain an instrument state, measurement calibration, and measurement data.

   **Print** key initiates a print function, allowing you to select the print conditions and printer.

   **Macro / Local** key allows you to manage and run macros. Also when the analyzer is in an automated mode, it allows the front panel to accept user input.

7. **Entry** keys allow you to enter values for measurement settings.

   Numeric keys (**0**, **1**, **2**, and so forth) selects values for measurement settings, then press **Enter**, **G/n**, or **M/μ** to complete the selection.

   Units keys (**G/n**, **M/μ**, or **Enter**) completes the value selection, assigning a unit of measurement. The **G/n** units key defines **G** equals the units being input times $10^9$ and **n** equals the units being input times $10^{-9}$. The **M/μ** units key defines **M** equals the units being input times $10^6$ and μ equals the units being input times $10^{-6}$. As an example, when you are entering the value for the center frequency and you enter the number 650 followed by the **M/μ** key, you are specifying a center frequency of 650 MHz.

   **Enter** key enters the values that you select for the measurement settings.

   Plus/Minus Backspace key (+/– ⇐) selects the appropriate sign when the cursor is in the first position of a numeric entry but serves as a backspace, deleting the previous character, in any other position.

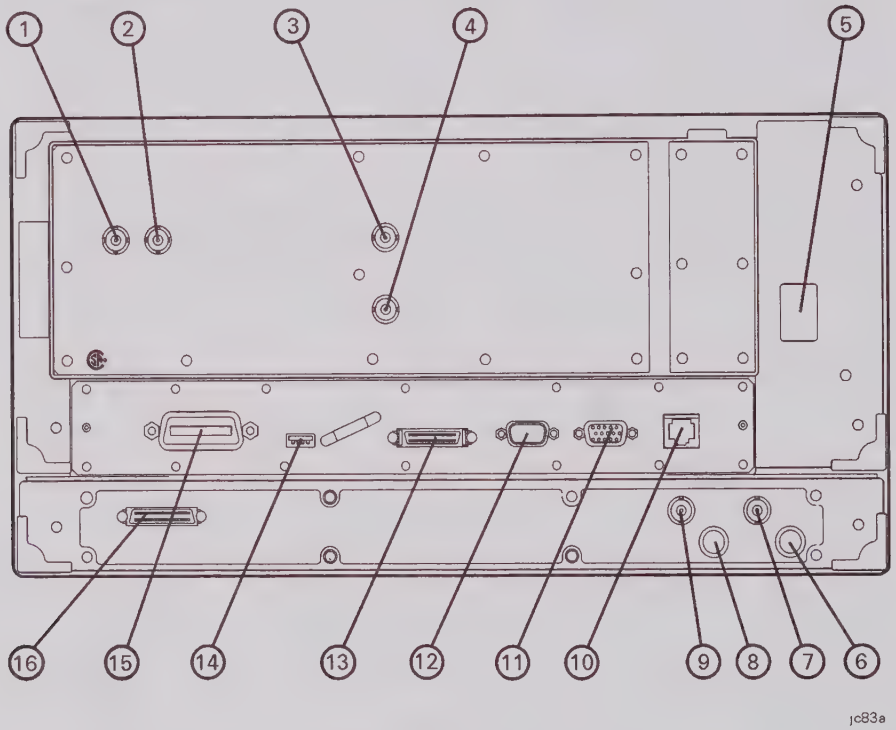
   Decimal Point key (.) enters a decimal point to designate fractions of a whole number.

   Front Panel knob rotates to increase or decrease the value of the active entry.

# Rear Panel

The network analyzer rear panel has several features with which to become familiar. Refer to Figure 2-4 for an illustration of the rear panel. This illustration is followed by the name and description of each feature.

**Figure 2-4 Rear Panel**




Refer to Figure 2-4 when identifying each of the following rear panel features. The embedded Help system in the analyzer lists the specifications for each connector.

1. **External Detector Input Connector**
   This BNC (female) connector allows you to input a buffered DC signal from an external, negative polarity diode detector for controlling the power level at the test ports.

2. **External AM Input Connector**
   This BNC (female) connector allows you to input a voltage that provides low frequency AM modulation to the test port output signal. You could also input a voltage to shift the test port output power level. An input of 0 volts leaves the power level unaffected. A positive voltage input shifts the test port power to a higher level. A negative voltage shifts the power to a lower level.

3. **10 MHz Reference Input Connector**
   This BNC (female) connector allows the analyzer to work with an external 10 MHz reference signal that has an input power level between –15 to +20 dBm.

4. **10 MHz Reference Output Connector**
   This BNC (female) connector provides a frequency 10 MHz reference (sine wave) signal. The output level of this reference signal is 10 dBm and has an output impedance of 50 ohms.

5. **AC Input**
   The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch (disconnecting device).

6. **Test Port 1 Bias Input Fuse**
   This is a bipin, non-time delay fuse rated at 1 A, 125 V.

7. **Test Port 1 Bias Input**
   This BNC (female) connector allows external bias to be applied at Test Port 1. This input has a maximum voltage of 30 VDC and a maximum current of 1A, (200 mA with no degradation of RF specifications). [a]

8. **Test Port 2 Bias Input Fuse**
   This is a bipin, non-time delay fuse rated at 1 A, 125 V.

9. **Test Port 2 Bias Input**
   This BNC (female) connector allows external bias to be applied at Test Port 2. This port has a maximum allowable voltage of ±30 $V_{DC}$ and a maximum current of ±1 A, (±200 mA with no degradation of RF specifications).[a]

10. **Local Area Network (LAN) Connector**
    This 10/100BaseT Ethernet connection has a standard 8-pin configuration and auto selects between the two data rates.

11. **Video Graphics Adapter (VGA) Output Connector**
    This 15-pin female D-sub connector allows connection of external VGA monitors with the following resolutions. You can simultaneously view the internal and external displays. The device resolutions are as follows: **Flat Panel (TFT):** 1024 × 768, 800 × 600, 640 × 480; **Flat Panel (DSTN):** 800 × 600, 640 × 480; **CRT Monitor:** 1280 × 1024, 1024 × 768, 800 × 600, 640 × 480

12. **Serial Interface Port (COM1) Connector**
    This 9-pin male D-sub connector is RS-232 compatible.

13. **Parallel Interface Port Connector**
    This 36-pin, mini-D, 1284-C connector provides connection to printers or any other parallel port peripheral. An adapter that allows connection between this parallel port and a Centronics port is provided.

14. **Universal Serial Bus (USB) Connector**
    This connector can be used to connect a USB mouse, keyboard, or other device. The USB jack is of the Type A configuration (4 contacts inline) Contact 1 (on the left) is Vcc (4.75 to 5.25 VDC, 500mA maximum, protected by an automatically resettable fuse rated at 1 A); Contact 2 is –Data; Contact 3 is +Data; and Contact 4 is Ground.

a. Up to 200 mA level, the instrument will meet all of its RF specifications. As the DC bias is increased, particularly at low RF frequencies (that is, typically <100 MHz, but predominantly >10 MHz), the low frequency corrected source match and directivity will degrade. Above 100 MHz RF, with up to 1 A bias, there is very little degradation in corrected source match and directivity.

15. **General Purpose Interface Bus (GPIB) Connector**
This 24-pin connector is a Type D-24, female compatible with IEEE-488.

16. **Auxiliary I/O Connector**
This connector provides the External Trigger (pin 18) and the Ready for Trigger (pin 19) signals.

# 3 Getting Started with Measurements

This chapter shows you how to make basic measurements with the PNA series network analyzer. A procedure has been created to step you through some basic measurements and show some of the network analyzer features. This procedure is shown in two ways.

- First, this procedure guides you through making the measurements using the mouse and keyboard that were provided with your analyzer. The mouse and keyboard method is quicker than using the keypad method. (Refer to "Making Basic Measurements using a Mouse and Keyboard" on page 3-3.)
- Then, the procedure guides you through making the same measurements using the front panel keypad. The keypad method is useful if your space is limited and you do not have a good place to leave the mouse and keyboard. (Refer to "Making Basic Measurements using the Front Panel Keypad" on page 3-21.)

Both methods have the complete access to the network analyzer features. However, the mouse and keyboard is required for some other Microsoft Windows 2000 Professional applications.

### Traces, Channels, and Windows

Before we start making measurements, there are three terms with which you should become familiar, *traces*, *channels*, and *windows*. Each of these terms is described below. As you follow the measurement procedure, it will also help with understanding each of these terms.

**Channel**: A channel has a set of independent attributes that are associated with collecting data. These attributes apply to all the traces assigned to that channel. The analyzer supports four independent channels.

**Trace:** A trace has a unique set of attributes that are associated with mathematical operations performed on the collected data. The analyzer supports up to 16 data traces. It also supports a maximum of four data traces and four memory traces on a window.

**Window**: A window is used for viewing traces. The analyzer can show 1, 2, 3, or 4 windows on the screen. A maximum of four data traces and four memory traces may be displayed on a window.

Additional information about these topics can be found in the Analyzer Operation Model topic on the Quick Start page of the PNA Series Network Analyzer Help system.

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**NOTE** Before beginning these procedures, make sure the network analyzer application is displayed. If the network analyzer application is not displayed, display it by clicking the **PNA Series Network Analyzer** taskbar button on the taskbar at the bottom of the screen. If this taskbar button is not on the taskbar, click the **Network Analyzer** icon on the desktop.

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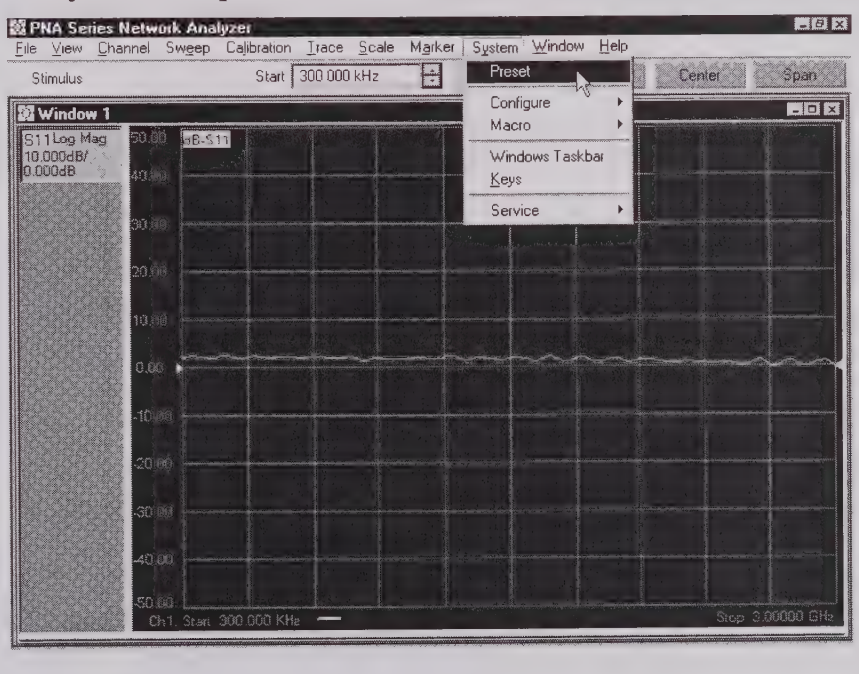
# Making Basic Measurements using a Mouse and Keyboard

This procedure guides you through setting up measurements using a mouse and keyboard. Measurements are set up in a variety of ways, using multiple traces, channels, and windows. A calibration procedure is also demonstrated using this procedure.

## Set Up the Measurement

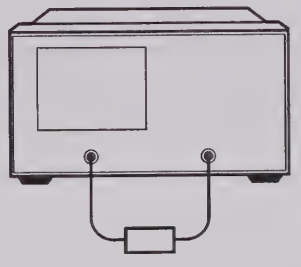
1. From the **System** menu, click **Preset**.

   Notice in the trace status bar on the left of your network analyzer screen that the network analyzer is set up to make S11 measurements.




2. Connect the DUT to the network analyzer.

   In this example, the DUT is a bandpass filter with a center frequency of approximately 1.53 GHz.

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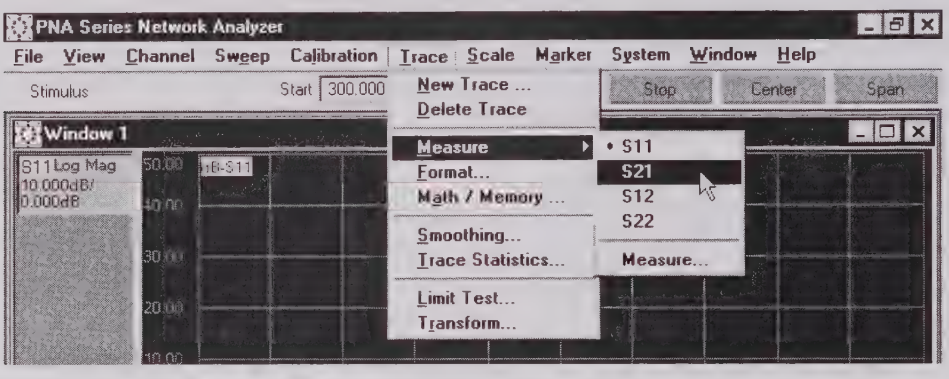
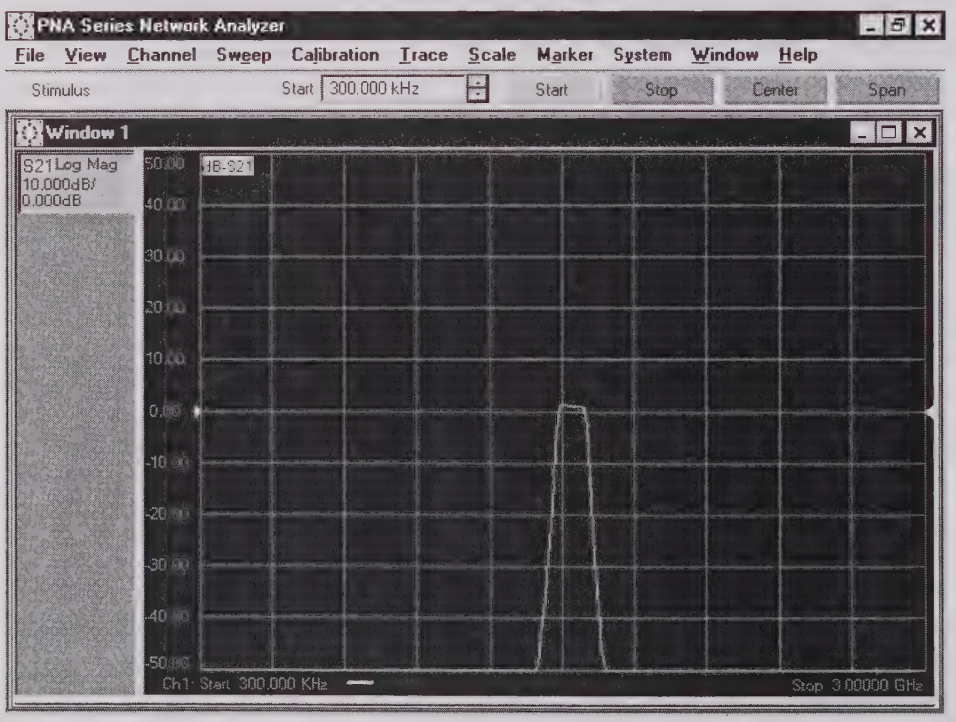
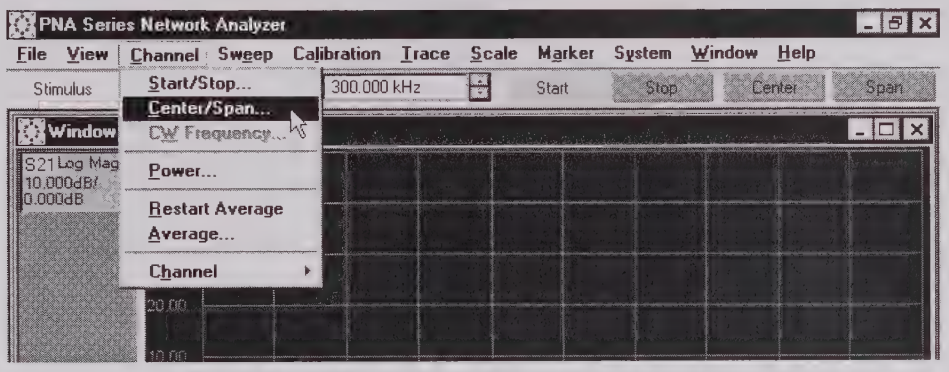
3. On the **Trace** menu, click **Measure**. **S11** is shown with an indicator to its left. Click **S21** to change to a S21 measurement.




The network analyzer now displays a different trace. Also notice that the trace status bar displays a S21 measurement.

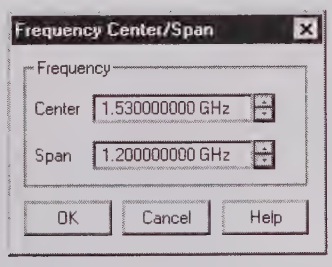


4. On the **Channel** menu, click **Center/Span** to display the **Frequency Center/Span** window.

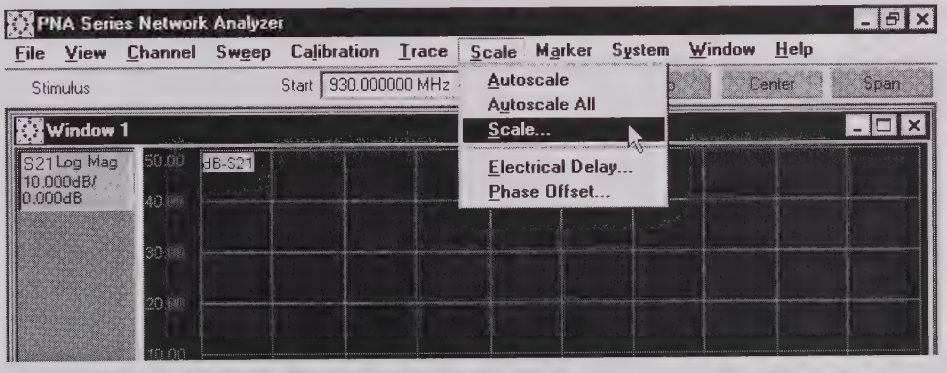



5. With the **Center** box highlighted, enter the center frequency of the bandpass filter. For this DUT, enter **1.53g** to center the 1.53 GHz pass band. Select the **Span** box and enter the span. This example uses a 1.2 GHz span, so enter **1.2g**. Click **OK**.

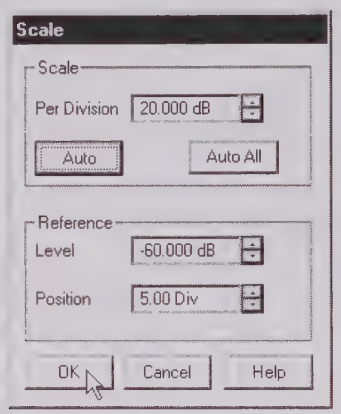
   Note that when using a USB keyboard to enter a frequency terminator, type "g" for GHz, "m" for MHz, and "k" for kHz.




6. On the **Scale** menu, click **Scale** to display the **Scale** window.

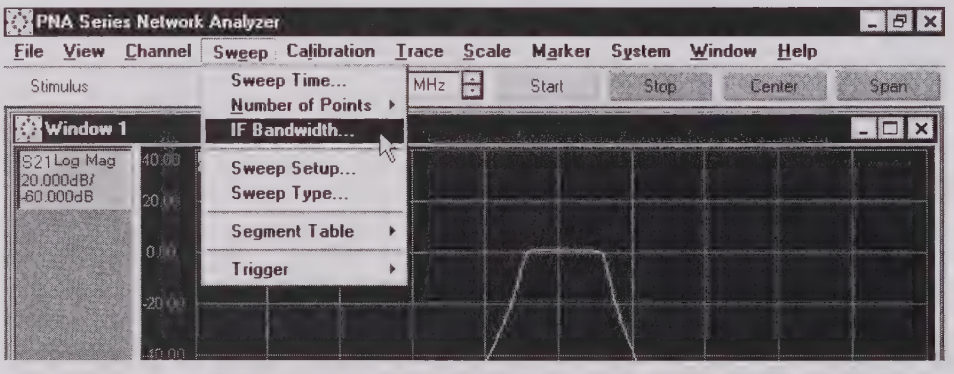


7. In the **Scale** window, set the scale and reference settings so the trace is easy to view. For this example, in the **Scale Per Division** box, enter **20**. In the **Reference Level** box, enter **-60**. Click **OK**.

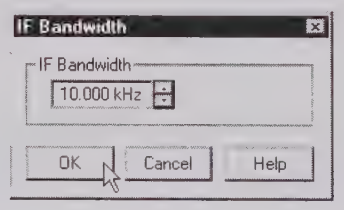



Note that Autoscale could have been selected to have the network analyzer automatically set the scale.

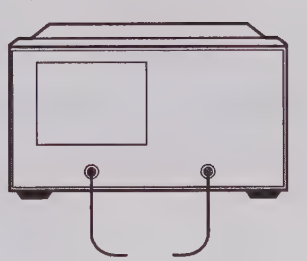
8. On the **Sweep** menu, click **IF Bandwidth**.




9. In the **IF Bandwidth** window, change the IF bandwidth setting so that the trace is sweeping at a stable level using the arrows. In this example, change the IF bandwidth setting to 10 **kHz**. Click **OK**.



10. Disconnect the test cables from the DUT.



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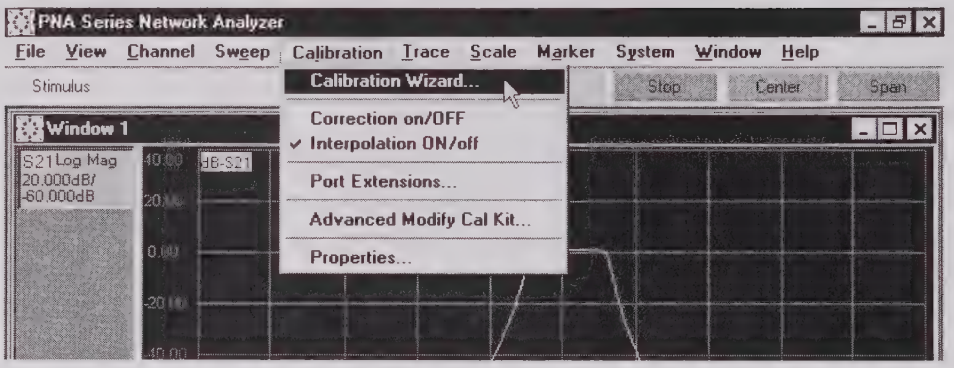
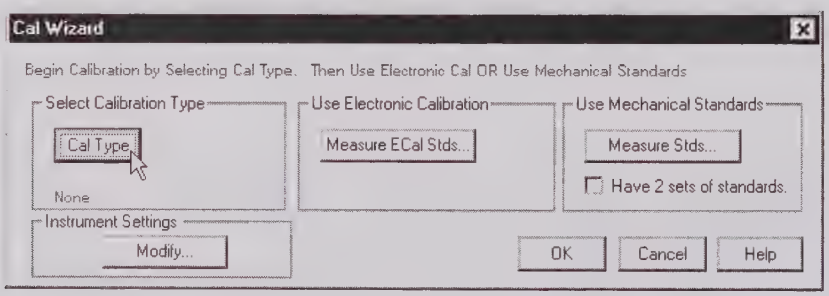
## Calibrate the Setup

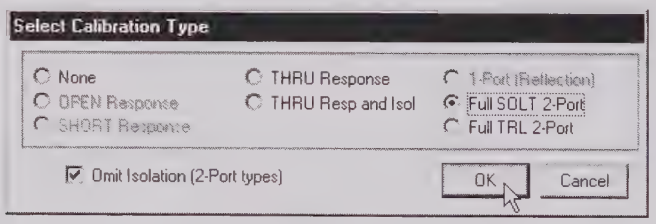
1. On the Calibration menu, click Calibration Wizard.



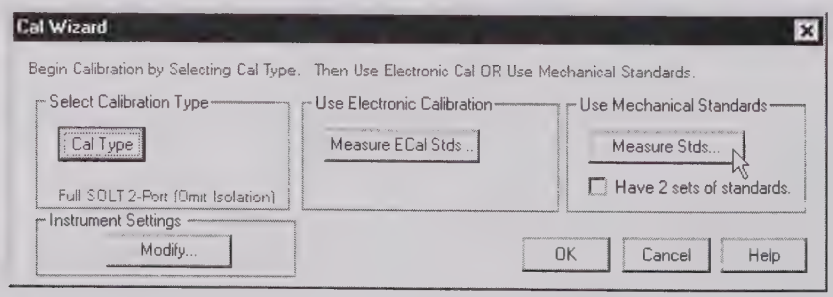

2. In the **Cal Wizard** window, click **Cal Type**.



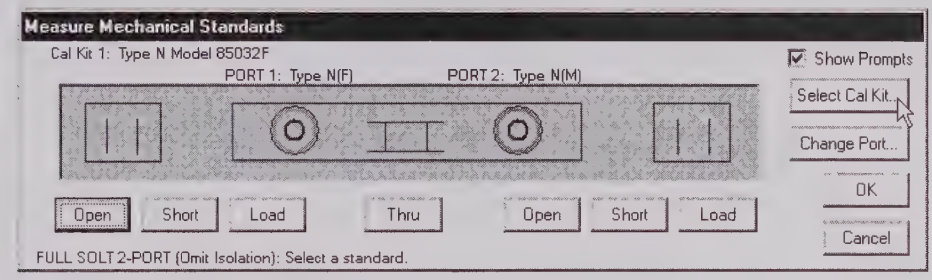

3. In the **Select Calibration Type** window, click **Full SOLT 2-Port**. The Short-Open-Load-Thru (SOLT) 2-port calibration calibrates for reflection and transmission measurements in both the forward and reverse directions. Click **OK**.



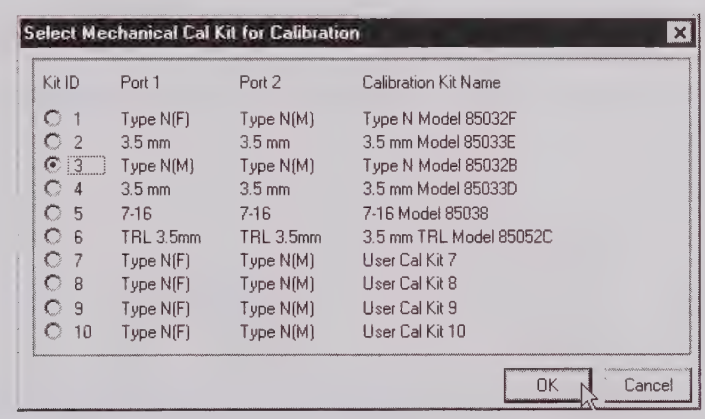

4. In the **Cal Wizard** window, click **Measure Stds** for using a mechanical calibration kit.



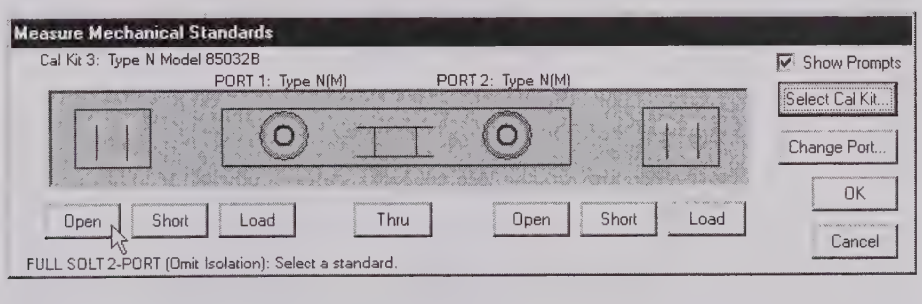
5. In the **Measure Mechanical Standards** window, click **Select Cal Kit**.



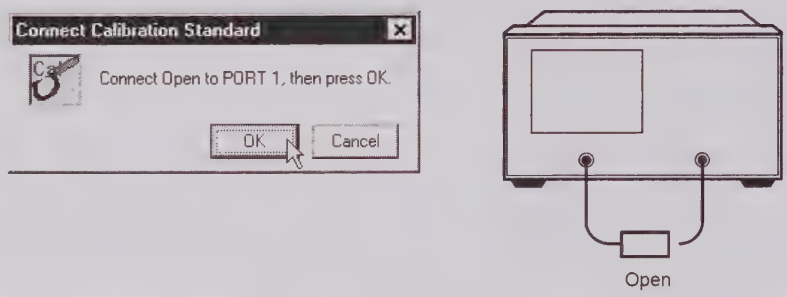

6. In the **Select Mechanical Cal Kit for Calibration** window, select the appropriate mechanical calibration kit. In this example, each end of the test cable is a type N (M) connection, so click **Kit ID 3 Type N (M) Type N (M) Type N Model 85032B**. Click **OK**.


Select Mechanical Cal Kit for Calibration
Kit ID
Port 1
Port 2
Calibration Kit Name
1 Type N(F) Type N(M) Type N Model 85032F
2 3.5 mm 3.5 mm 3.5 mm Model 85033E
3 Type N(M) Type N(M) Type N Model 85032B
4 3.5 mm 3.5 mm 3.5 mm Model 85033D
5 7-16 7-16 7-16 Model 85038
6 TRL 3.5mm TRL 3.5mm 3.5 mm TRL Model 85052C
7 Type N(F) Type N(M) User Cal Kit 7
8 Type N(F) Type N(M) User Cal Kit 8
9 Type N(F) Type N(M) User Cal Kit 9
10 Type N(F) Type N(M) User Cal Kit 10
OK
Cancel

7. In the **Measure Mechanical Standards** window, measure the open, short, load, and thru standards by selecting the button for each. Select the **Open** for Test Port 1 on the left of the window. Calibrate from left to right.



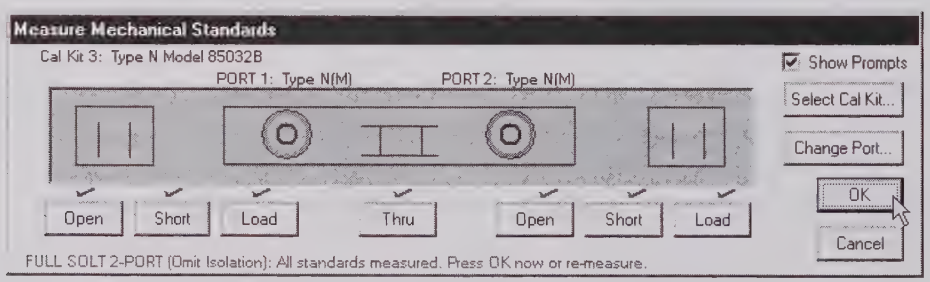
8. Connect the standards as prompted in the **Connect Calibration Standard** window. After each standard has been measured, a check mark is displayed above the corresponding button in the **Measure Mechanical Standards** window.



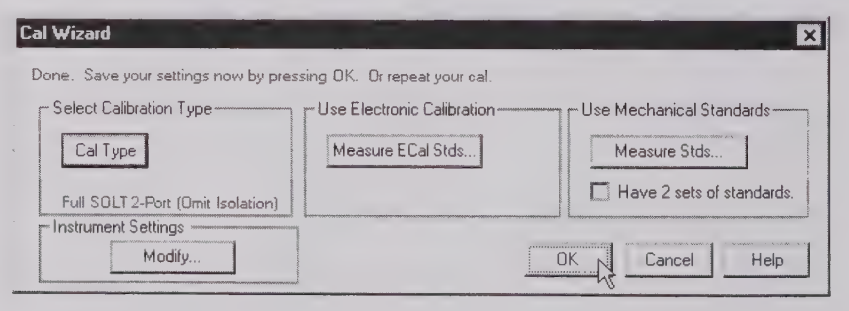

9. Repeat the previous two steps, calibrating the remaining standards from left to right, following the prompts as each standard is selected.

**NOTE** If you inadvertently use the wrong setup during the calibration, you do not have to recalibrate all of the standards again. Rerun the calibration for the individual standard and the correct data will be saved.

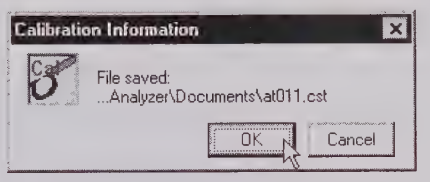
10. After all standards have been measured, click **OK**.




11. In the **Cal Wizard** window, click **OK**.

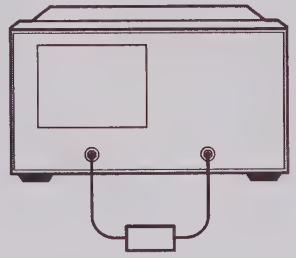


12. A **Calibration Information** window is displayed showing that the calibration data is being saved along with the path and file name of the data. Click **OK**.




After the calibration is complete, the analyzer returns to the measurement mode.

13. Reattach the cables to the DUT.

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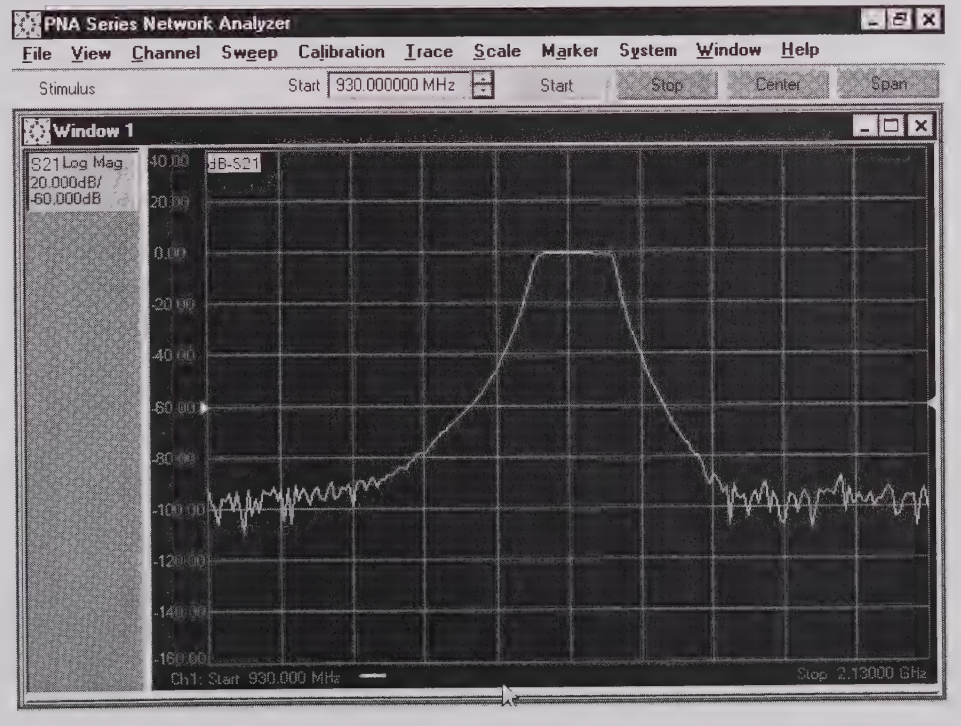
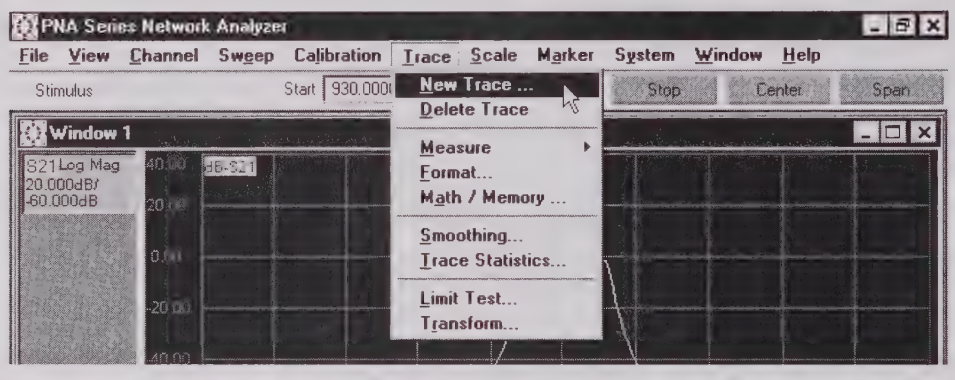
The network analyzer is now making a calibrated S21 measurement of the DUT.



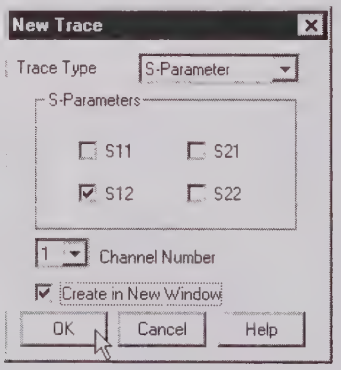
## Display a Second Window with Two Measurement Traces

This procedure displays a second window. This second window will display two measurements (S12 and S22) on the same channel.

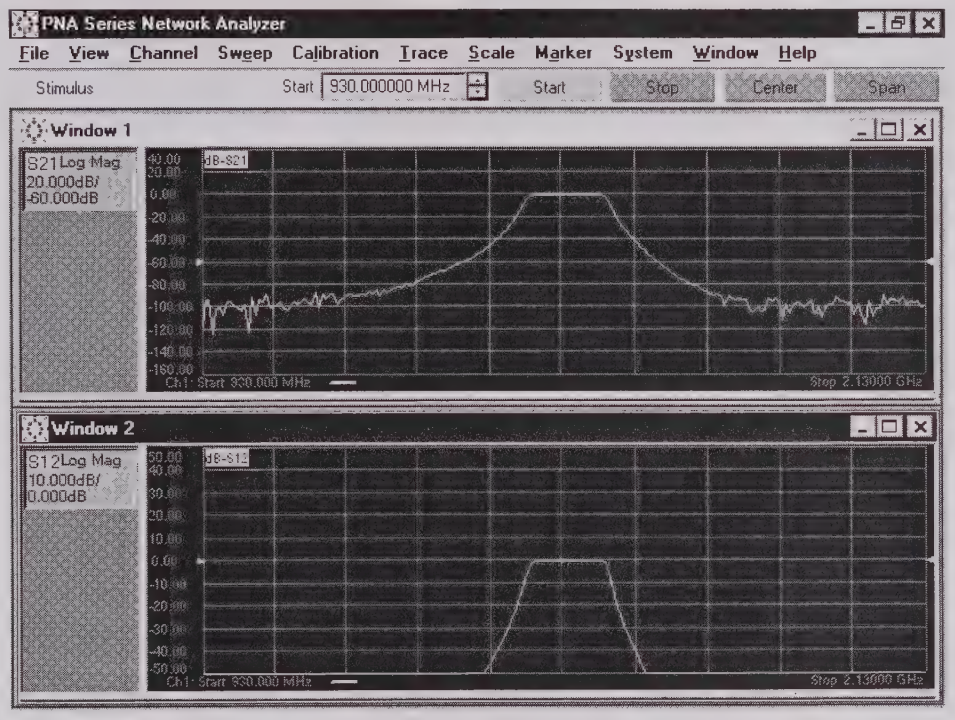
1. From the **Trace** menu, click **New Trace** to display the **New Trace** window.




2. Under **S-Parameters**, click **S12.** Select the **Create in a New Window** check box. Click **OK**.

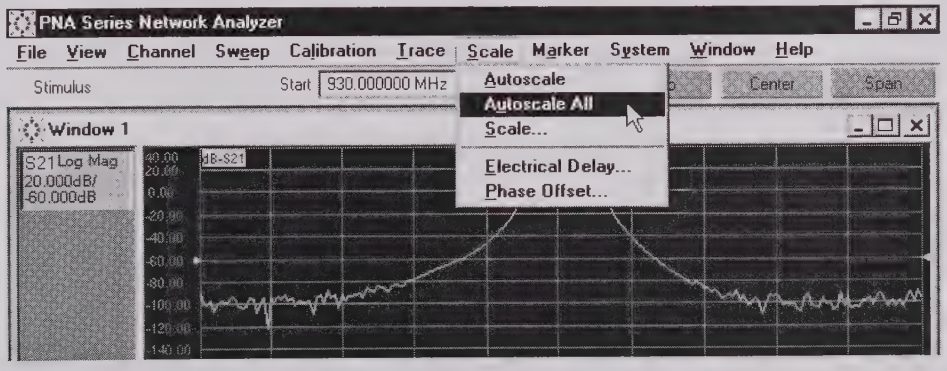


Two windows are now displayed. Window 1, the original window with an S21 measurement, is displayed above Window 2, the new window with S12 measurement.

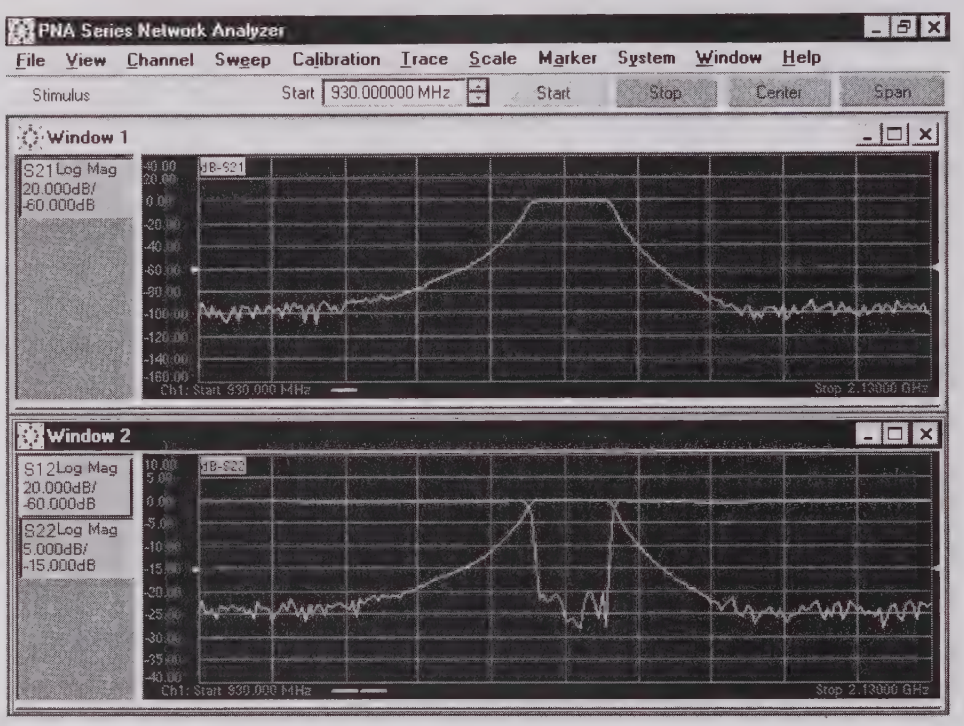



Now, add the second measurement, an S22 measurement trace, to Channel 1 of Window 2.

3. From the **Trace** menu, click **New Trace**.
4. Under **S-Parameters**, click **S22**. Click **OK**.
5. From the **Scale** menu, click **Autoscale All** to autoscale both of the traces in Window 2.



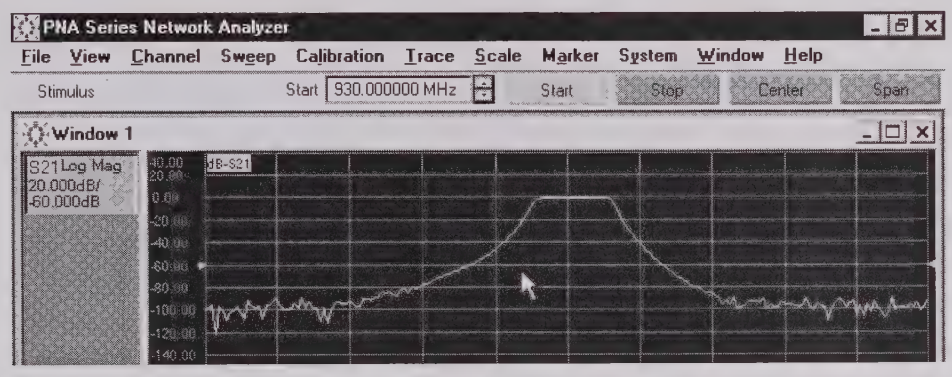
Window 1, with a S21 measurement, is displayed above Window 2, with a S12 and a S22 measurement.



## Display Multiple Channels in a Window

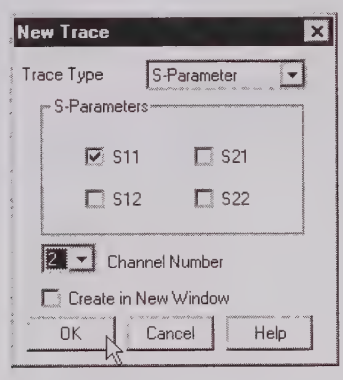
This procedure displays two additional measurement traces to Window 1. These two new measurements (S11 and a second S21) are displayed on separate channels.

1. Select Window 1 by clicking anywhere within the window.



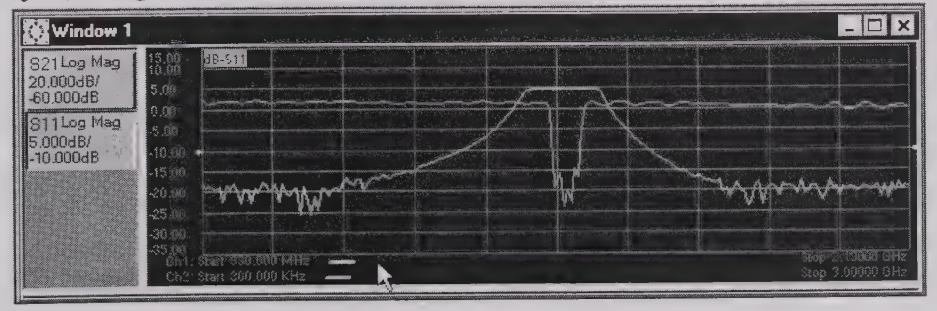

   Notice that the title bar of the window is dark with light text when the window is selected.

2. From the **Trace** menu, click **New Trace**.
3. Under **S-Parameters**, click **S11**. In **Channel Number** box, click **2**. Click **OK**.



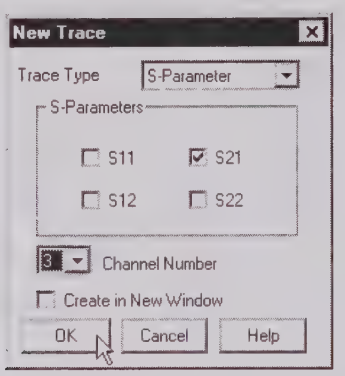

4. From the **Scale** menu, select **Autoscale**.

   The S11 trace is displayed on the screen grid and indicated on the trace bar. Also notice that near the bottom of the Window 1 screen grid, channel 1 and channel 2 settings are displayed, along with a color indicator to distinguish between the traces.

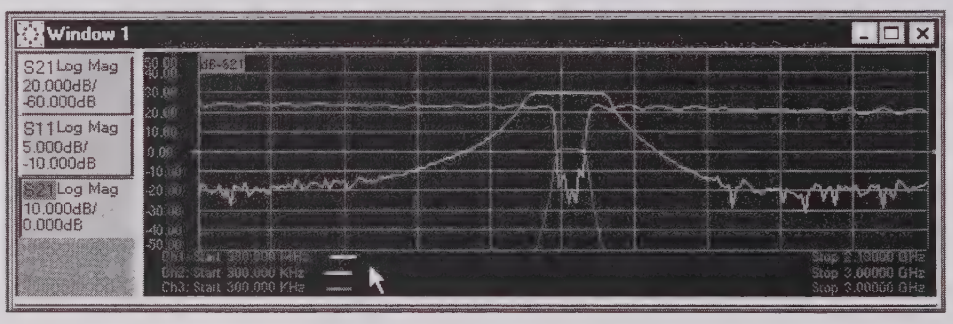


Now, add another S21 measurement to the display. This S21 measurement is displayed in a narrow span on a third channel.

5. From the **Trace** menu, click **New Trace**.
6. Under **S-Parameters**, click **S21**. In **Channel Number** box, click **3**. Click **OK**.



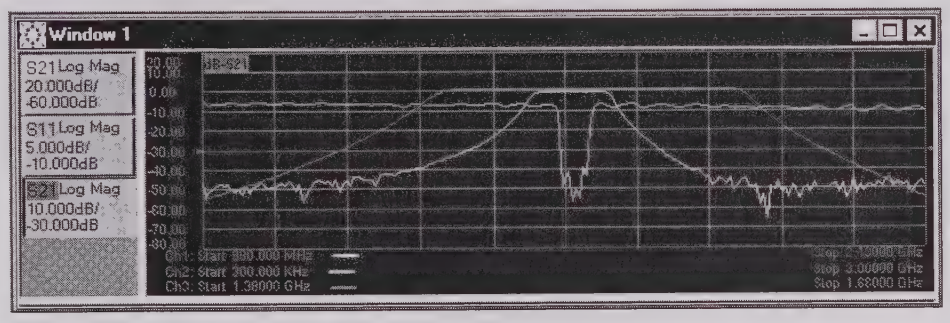

A new trace is displayed and channel 3 information is now displayed near the bottom of the Window 1.



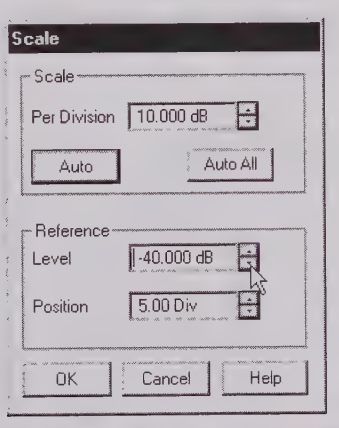

7. From the **Channel** menu, click **Center/Span** to display the **Frequency Center/Span** window.
8. In the **Center** box, type **1.53g** to set the center frequency to 1.53 GHz. In the Span box, type **300m** to set the span to 300 MHz. Click **OK**.

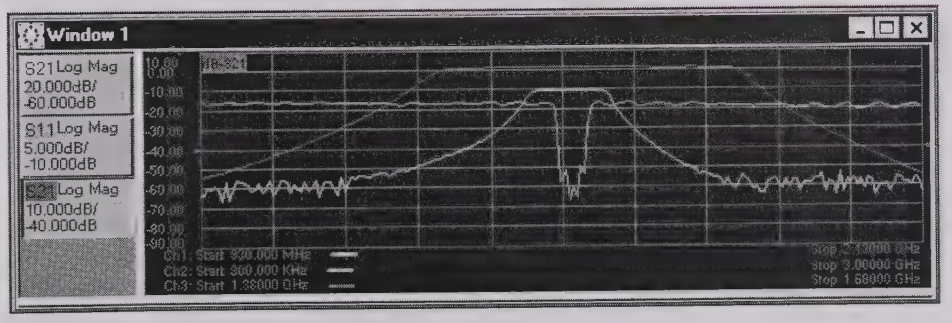
9. From the **Scale** menu, select **Autoscale**.

   Note that three measurement traces are displayed in Window 1. The trace bar, along the left edge of the display, indicates that there are two S21 measurements (one in wide and one in narrow span) and an S11 measurement. Also, near the bottom of Window 1, the three traces and their start and stop frequencies are list along with their color indicators.




10. If the two S21 measurements are difficult to view, select one of the measurement traces on the trace bar, and select **Scale** from the **Scale** menu. Then, change the reference level by selecting the **Level** box and typing in a new level or clicking the arrows to select a new level until both traces can be seen clearly. (Notice that the scaling for each trace is independent.) Then, click **OK**.

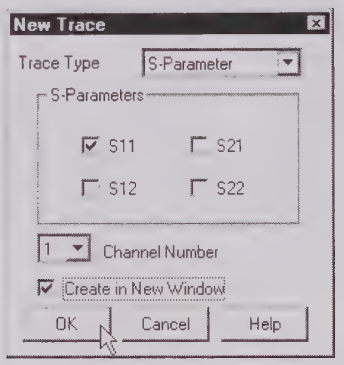


## Display a Third Window with a Different Format

This procedure displays two reflection measurement traces in a third Window. The two measurement traces are S11 and S22 displayed in Smith Chart Format.

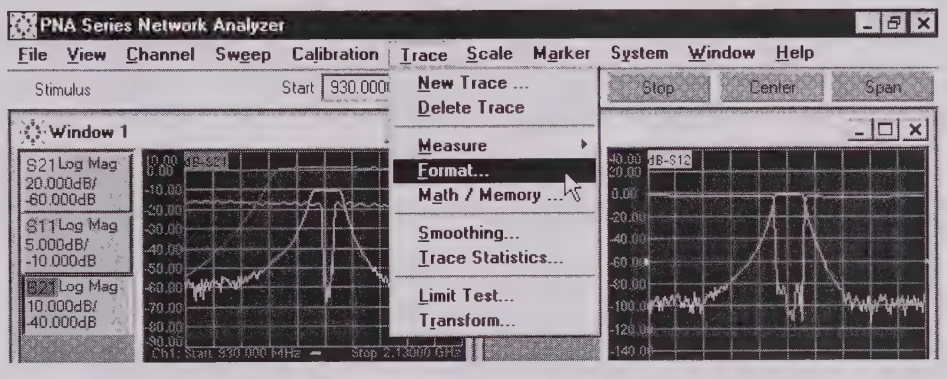
1. From the **Trace** menu, click **New Trace**.
2. Under **S-Parameters**, click **S11**. In **Channel Number** box, click **1**. Select the **Create in New Window** check box. Click **OK**.



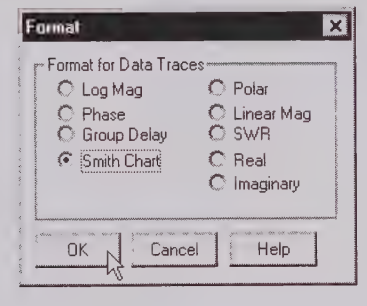

The first two windows are displayed side by side and Window 3, the new window, is displayed across the bottom of the screen grid.

Now, change the trace format in Window 3 from LogMag format to Smith Chart format.

3. From the **Trace** menu, select **Format** to display the **Format** window.

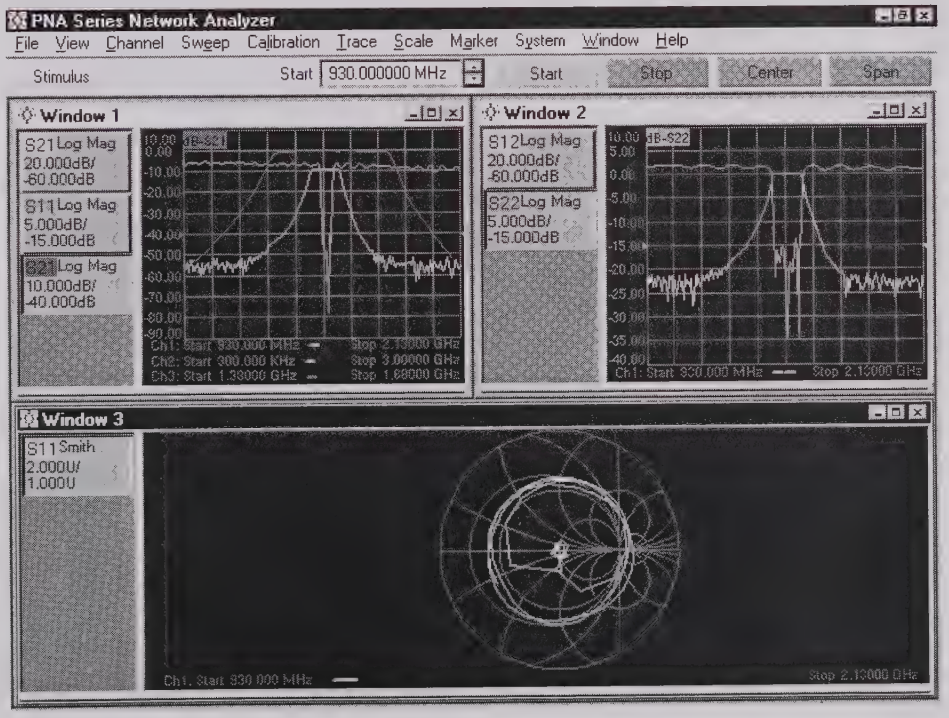



4. Under the **Format for Data Traces**, select **Smith Chart**. Then, click **OK**.




5. From the **Scale** menu, select **Autoscale**.

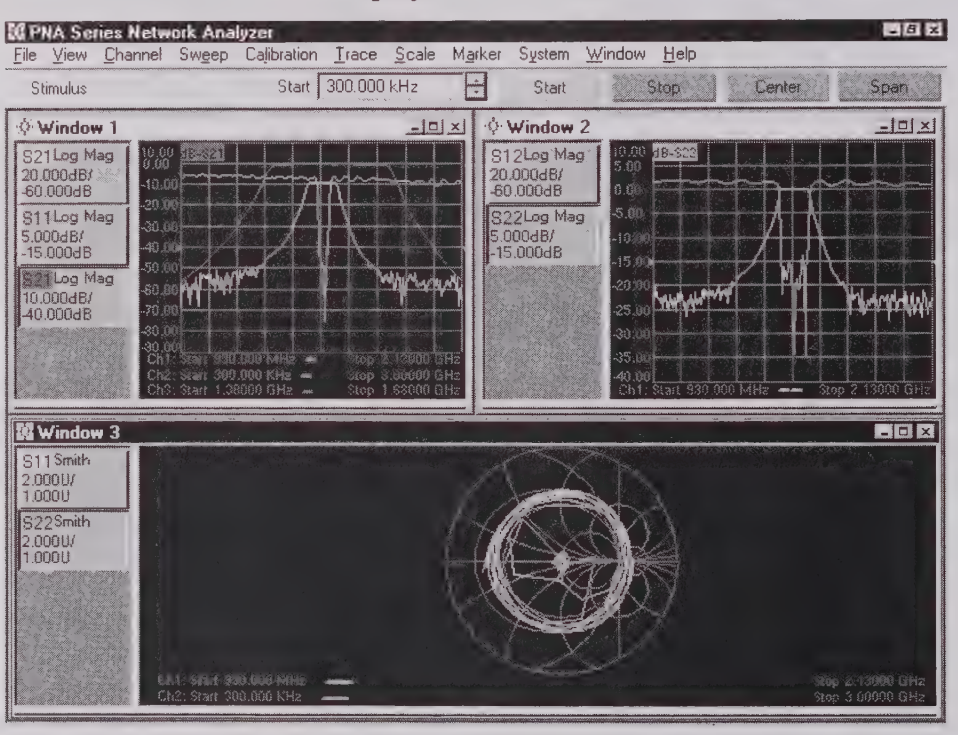
   The S11 reflection measurement is now displayed in Smith chart format in Window 3.



Now, add the second reflection measurement, a S22 measurement, to Window 3.

6. From the **Trace** menu, click **New Trace**.
7. Under **S-Parameters**, click **S22**. In **Channel Number** box, click **2**. Click **OK**.
8. From the **Scale** menu, select **Autoscale**.

The S22 measurement trace is displayed in Window 3.



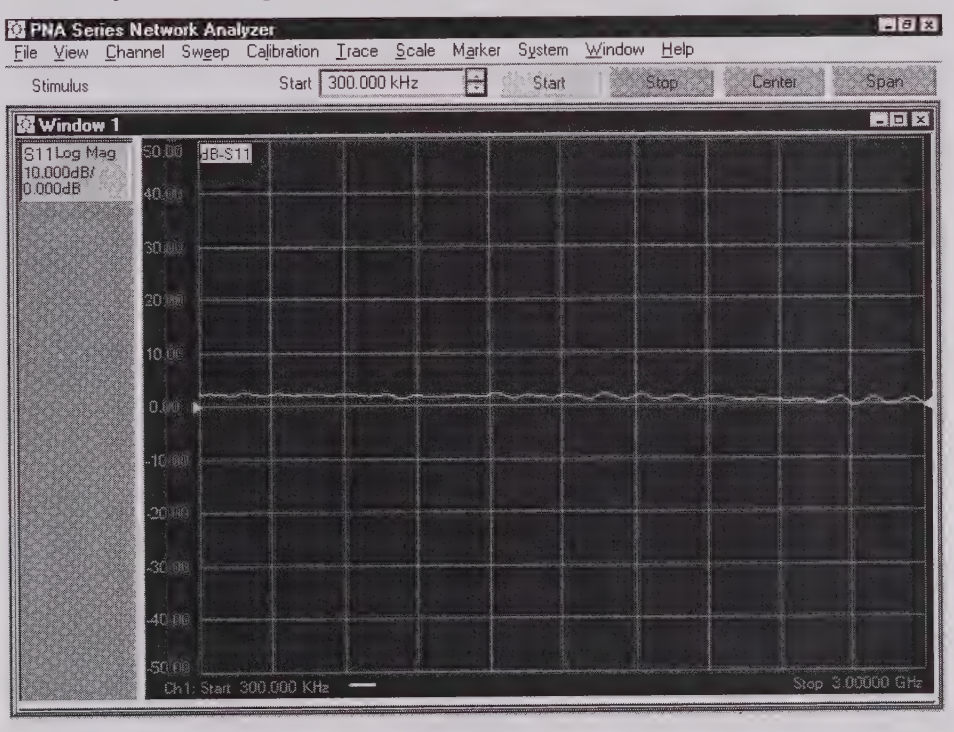
# Making Basic Measurements using the Front Panel Keypad

This procedure guides you through setting up measurements using the front panel keypad. Measurements are set up in a variety of ways, using multiple traces, channels, and windows. A calibration procedure is also demonstrated using this procedure.

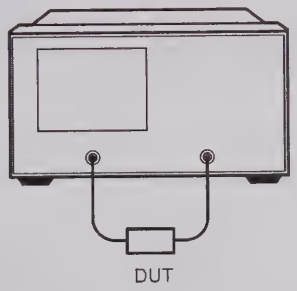
## Set Up the Measurement

1. From the **TRACE SETUP** block, press **Preset**.

   Notice in the trace status bar, on the left of your network analyzer screen, that the network analyzer is set up to make S11 measurements.




2. Connect the DUT to the network analyzer. In this example, the DUT is a bandpass filter with a center frequency of approximately 1.53 GHz.

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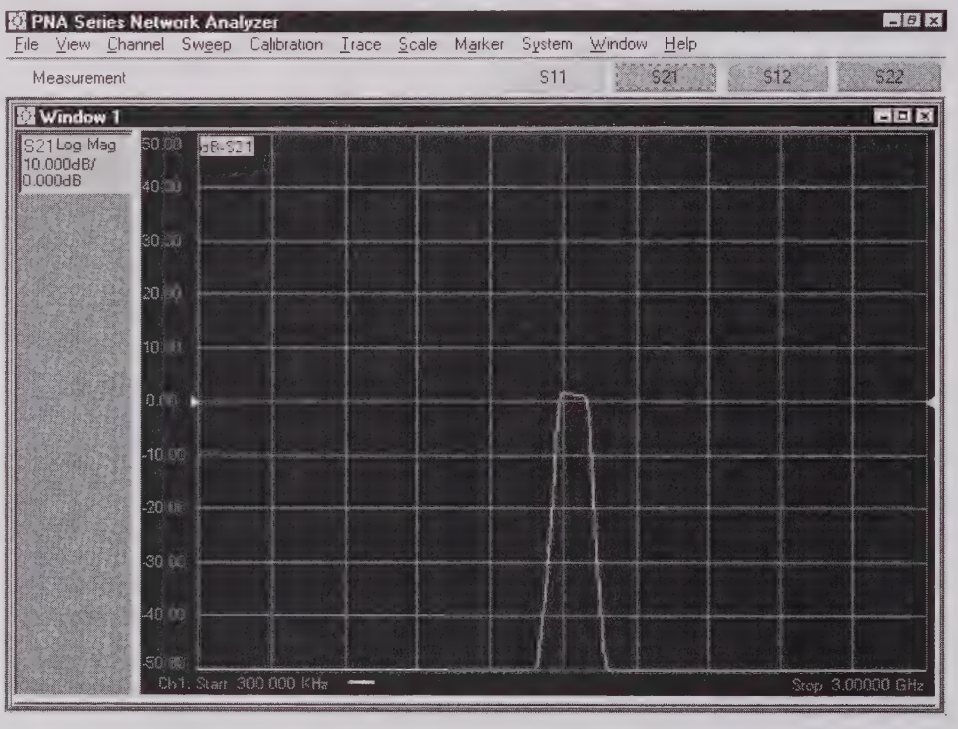
3. From the **TRACE SETUP** block, press **Measure**. From the **NAVIGATION** block, press **F2** (**S21**).

   The network analyzer now displays a different trace. Also notice that the trace status bar displays an S21 measurement.



4. From the **CHANNEL SETUP** block, press **Start/Center**. From the **NAVIGATION** block, press **F3** (**Center**). From the **ENTRY** block, press **1.53 G/n** to center the 1.53 GHz pass band. To set the span to 1.2 GHz, press **F4** (**Span**) and enter **1.2 G/n**.

---

**NOTE** Units keys (**G/n**, **M/μ**, or **Enter**) completes the value selection, assigning a unit of measurement. The **G/n** units key defines **G** as the units being input times $10^9$ and **n** as the units being input times $10^{-9}$. The **M/μ** units key defines **M** as the units being input times $10^6$ and μ as the units being input times $10^{-6}$. **Enter** has no multiplication factor.

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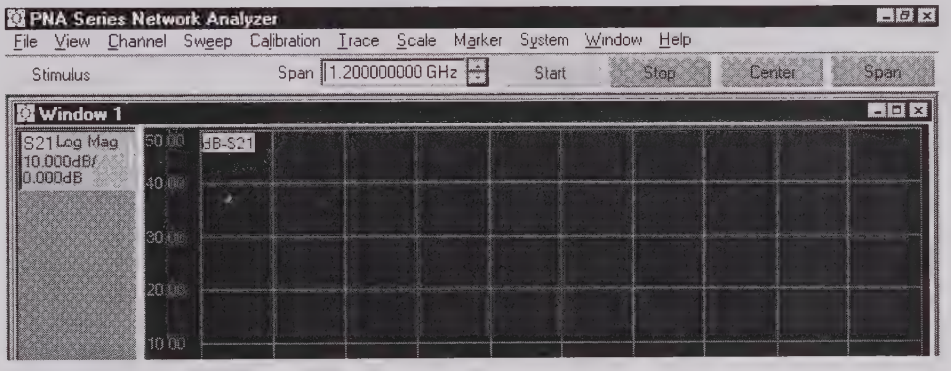
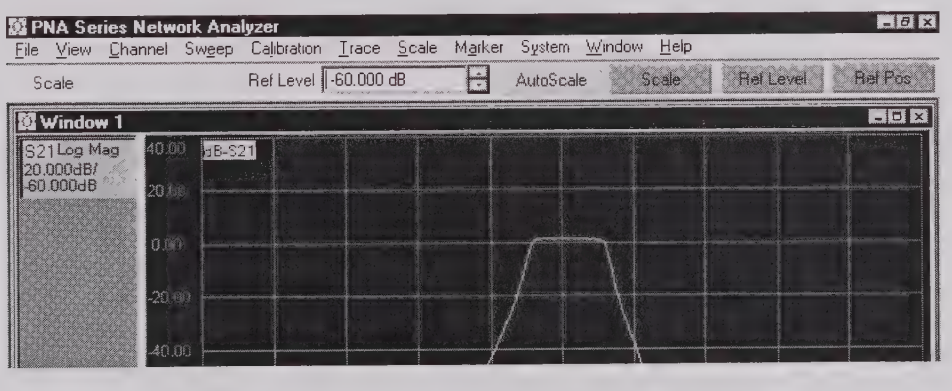
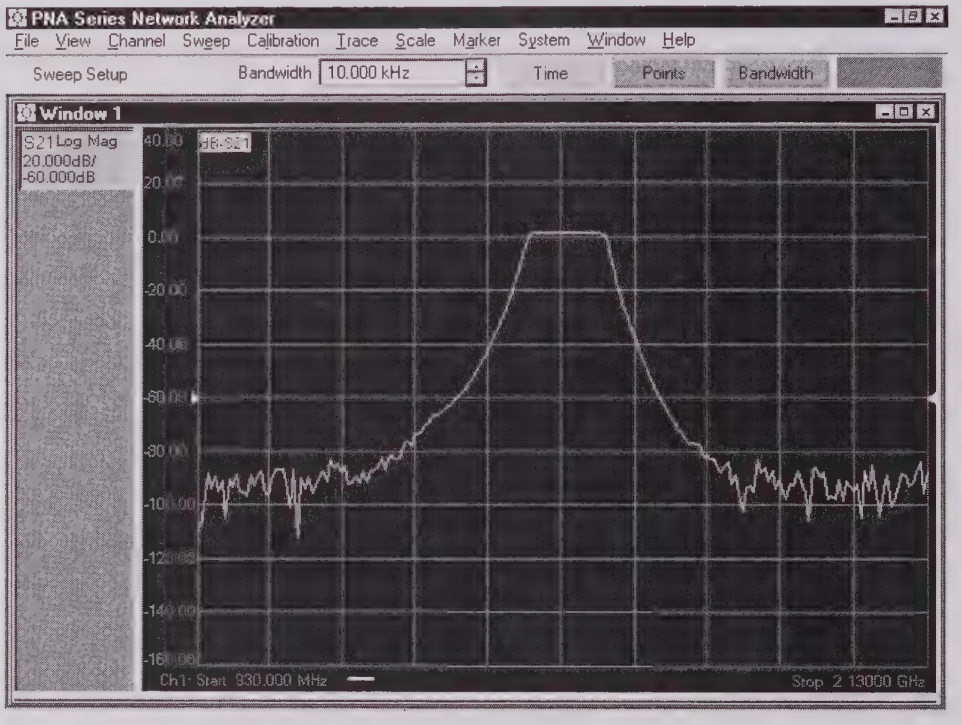



5. From the **TRACE SETUP** block, press **Scale**. Press **F2** (**Scale**). From the **ENTRY** block, press **20**, **Enter** to set the scale to 20 dB/division. Press **F3** (**Ref Level**). Press **-60**, **Enter** to set the reference level to –60 dB.

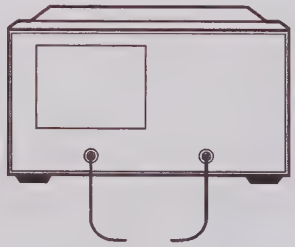
   Note that **Scale**, **F1** (**Autoscale**) could have been selected to have the network analyzer automatically set the scale.



6. From the **CHANNEL SETUP** block, press **Sweep Setup**. Press F3 (**Bandwidth**). From the **NAVIGATION** block, press Up Arrow or Down Arrow until the bandwidth is set to 10 kHz.




7. Disconnect the test cables from the DUT.



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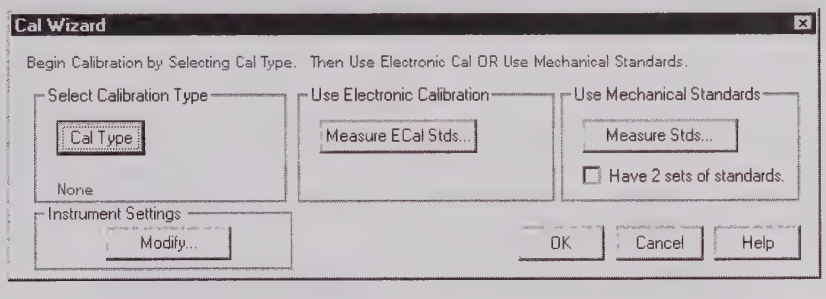
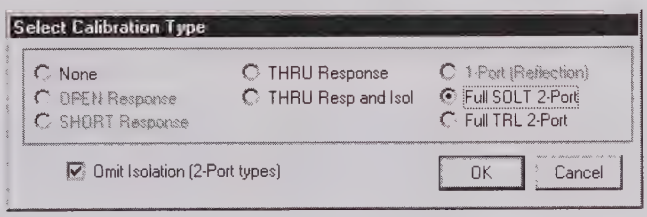
## Calibrate the Setup

1. In the Calibration menu, click Calibration Wizard.
2. From the **CHANNEL SETUP** block, press **Cal**. Press **F1** (**Cal Wizard**).
3. In the **Cal Wizard** window, press Right Tab until the **Cal Type** button is selected. From the **NAVIGATION** block, press **Click**.

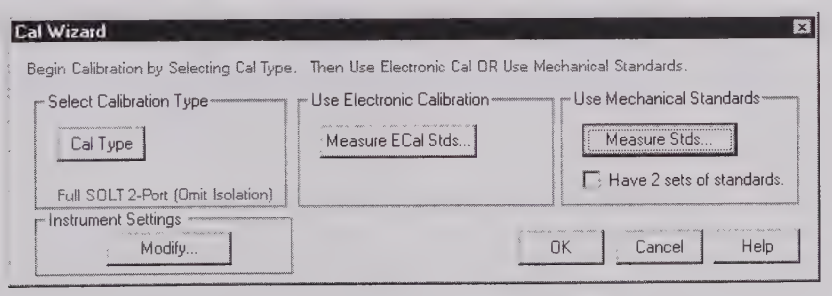



**NOTE** An item is selected when a dotted line is displayed around the item label. As an example, in the illustration above, **Cal Type** is selected.

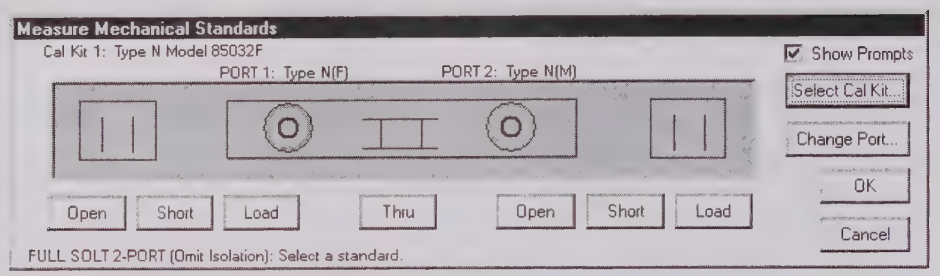
4. In the **Select Calibration Type** window, press Up Arrow or Down Arrow until **Full SOLT 2-Port** is selected. The Short-Open-Load-Thru (SOLT) 2-port calibration calibrates for reflection and transmission measurements in both the forward and reverse directions. Press **OK**.



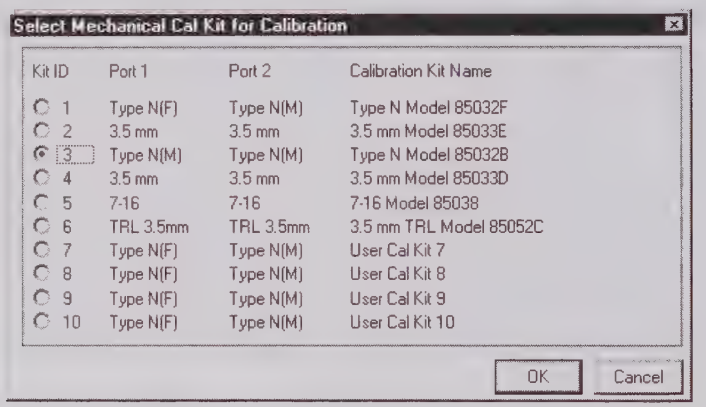

5. In the **Cal Wizard** window, press Right Tab until **Measure Stds** is selected for using a mechanical calibration kit. Then, press **Click**.



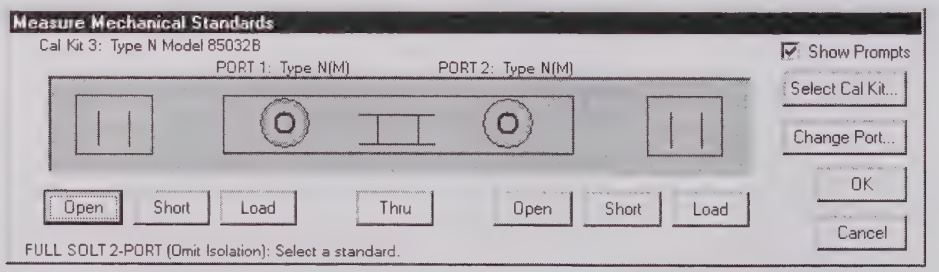
6. Press Right Tab until **Select Cal Kit** is selected. Then, press **Click.**



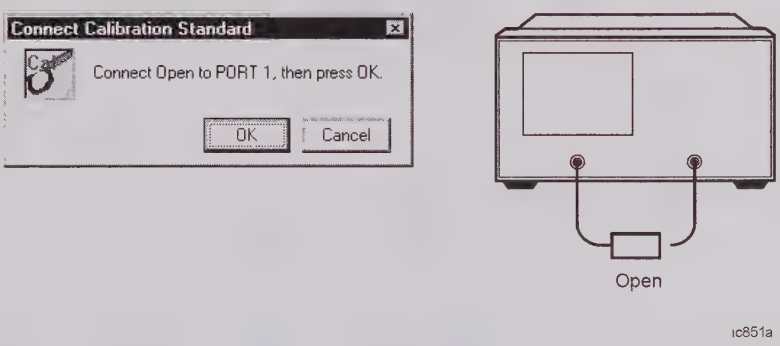

7. In the **Select Mechanical Cal Kit for Calibration** window, select the appropriate mechanical calibration kit. In this example, each end of the test cable is a type N (M) connection, press Up Arrow or Down Arrow until **Kit ID 3 Type N (M) Type N (M) Type N Model 85032B** is selected. Press **OK**.


Select Mechanical Cal Kit for Calibration
Kit ID
Port 1
Port 2
Calibration Kit Name
1 Type N(F) Type N(M) Type N Model 85032F
2 3.5 mm 3.5 mm 3.5 mm Model 85033E
3 Type N(M) Type N(M) Type N Model 85032B
4 3.5 mm 3.5 mm 3.5 mm Model 85033D
5 7-16 7-16 7-16 Model 85038
6 TRL 3.5mm TRL 3.5mm 3.5 mm TRL Model 85052C
7 Type N(F) Type N(M) User Cal Kit 7
8 Type N(F) Type N(M) User Cal Kit 8
9 Type N(F) Type N(M) User Cal Kit 9
10 Type N(F) Type N(M) User Cal Kit 10
OK
Cancel

8. In the **Measure Mechanical Standards** window, the short, open, load, and thru standards are measured by selecting the button for each. So to calibrate the first standard, press Right Tab until the **Open** button for Test Port 1 is selected and press **Click.**



9. Connect the standards as prompted in the **Connect Calibration Standard** window and then press **Click**. After each standard has been measured, a check mark is displayed above the corresponding button in the **Measure Mechanical Standards** window.




10. Repeat the previous two steps, calibrating the remaining standards from left to right, following the prompts as each standard is selected.

---

**NOTE** If you inadvertently use the wrong setup during the calibration, you do not have to recalibrate all of the standards again. Rerun the calibration for the individual standard and the correct data will be saved.

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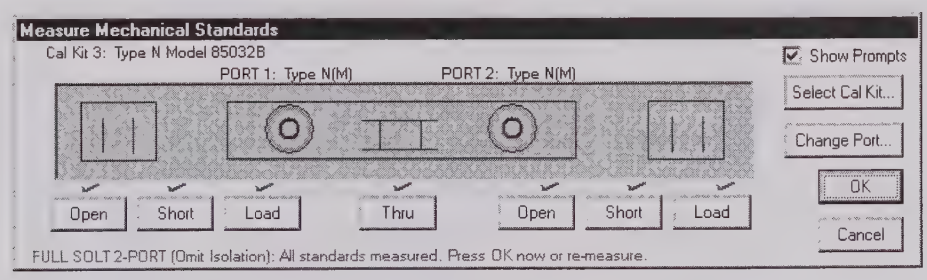
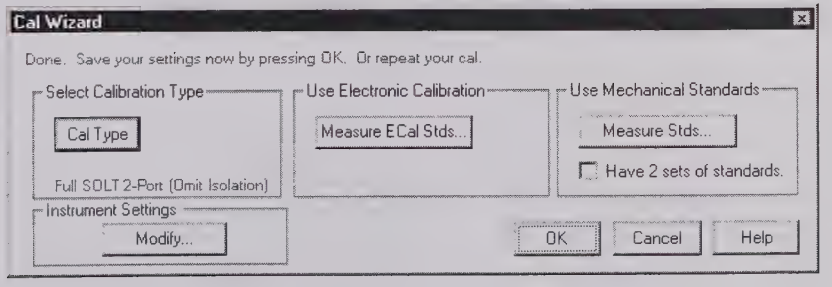
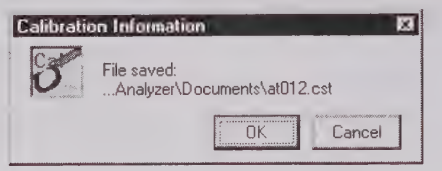
11. After all standards have been measured, press **OK**.




12. In the **Cal Wizard** window, press **OK**.

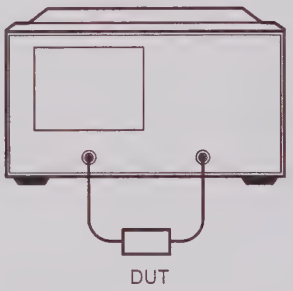


13. A **Calibration Information** window is displayed showing that the calibration data is being saved along with the path and file name of the data. Press **OK**.




After the calibration is complete, the network analyzer returns to the measurement mode.

14. Reattach the cables to the DUT.

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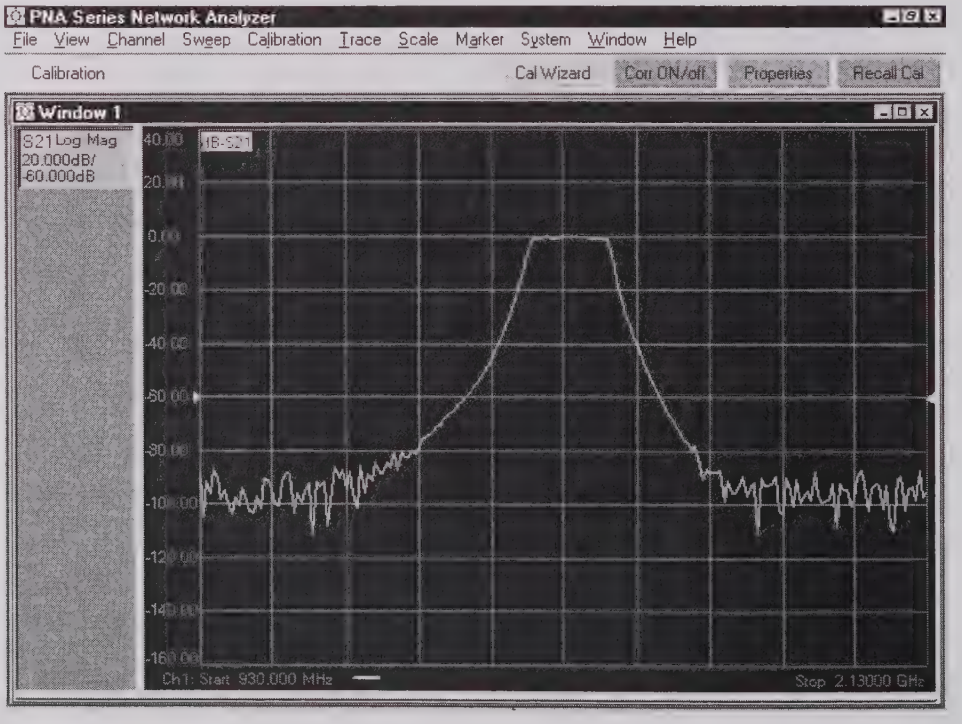
The network analyzer is now making a calibrated S21 measurement of the DUT.



## Display a Second Window with Two Measurement Traces

This procedure displays a second window. This second window will display two measurements (S12 and S22) on the same channel.

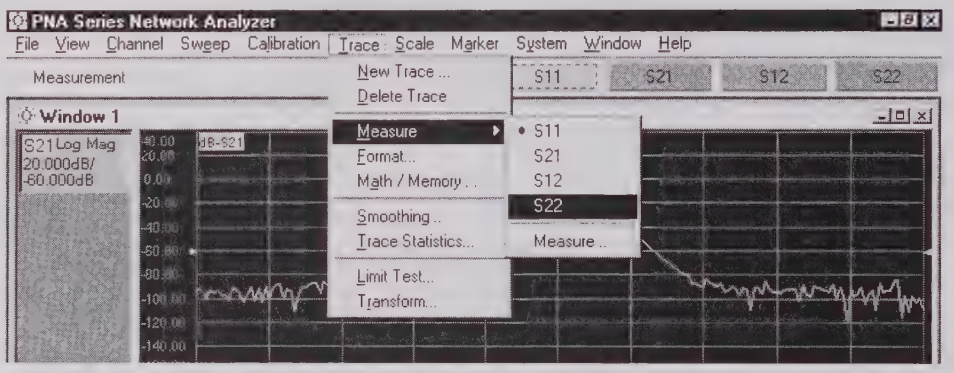
1. From the **DISPLAY** block, press **Window,** then press **F1** (**New**).
2. From the **TRACE SETUP** block, press **Measure** then press **F3** (**S12**).
3. From the **TRACE SETUP** block, press **Scale** then press **F1** (**Autoscale**).

   Two windows are displayed. Window 1, the original window with a S21 measurement, is displayed above Window 2, the new window with S12 measurement.

   Now, add the second measurement, a S22 measurement trace, to Channel 1 of Window 2.

4. From the **DISPLAY** block, press **Trace** then press **F1** (**New**).

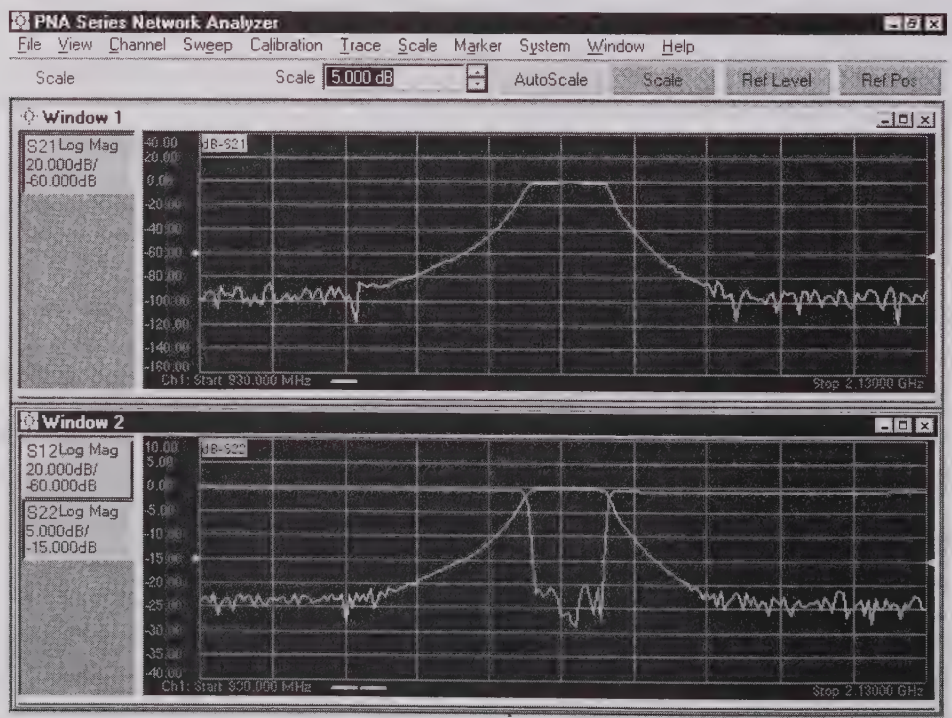
5. Press **Menu/Dialog**. Press Right Tab until the **Trace** menu is displayed. Press Down Arrow until **Measure** is selected, then press **Click**. Press Down Arrow until **S22** is selected, then press **Click**.




**NOTE** This step performs a similar task as was performed in step 2 of this section. However, performing the task in this manner provides the same flexibility (through the menu bar) as if you were performing the task with a mouse using the menu bar.

6. From the **TRACE SETUP** block, press **Scale** then press **F1** (**Autoscale**).

   Window 1, with a S21 measurement, is displayed above Window 2, with a S12 and a S22 measurement.



## Display Multiple Channels in a Window

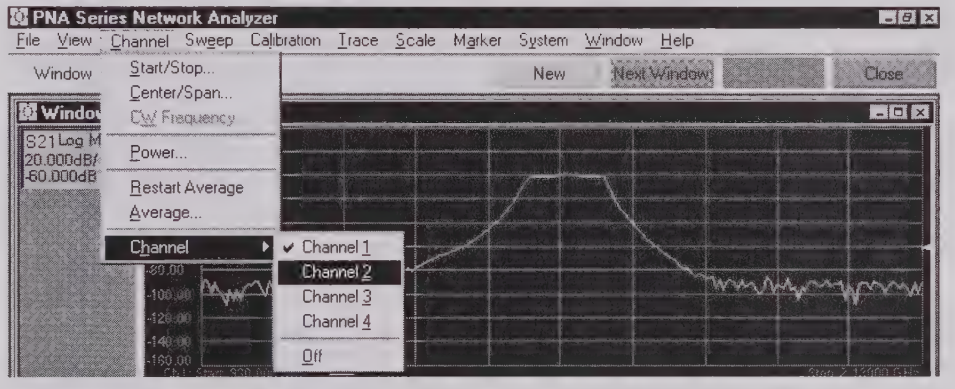
This procedure displays two additional measurement traces to Window 1. These two new measurements (S11 and a second S21) are displayed on separate channels.

1. From the **DISPLAY** block, press **Window** to select Window 1. Then, press **F2** (**Next Window**).

   Notice that the title bar of the window is dark with light text when the window is selected.

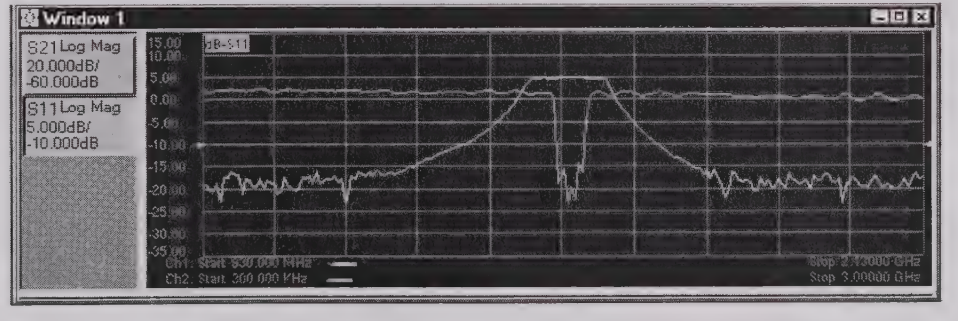
   Now, add a S11 measurement to the window. This S11 measurement is displayed on channel 2.

2. From the **COMMAND** block, press **Menu/Dialog**. Press Right Tab until the **Channel** menu is displayed. Press Down Arrow until **Channel** is selected, then press **Click**. Press Down Arrow until **Channel 2** is selected, then press **Click**.




3. From the **TRACE SETUP** block, press **Scale** then press **F1** (**Autoscale**).

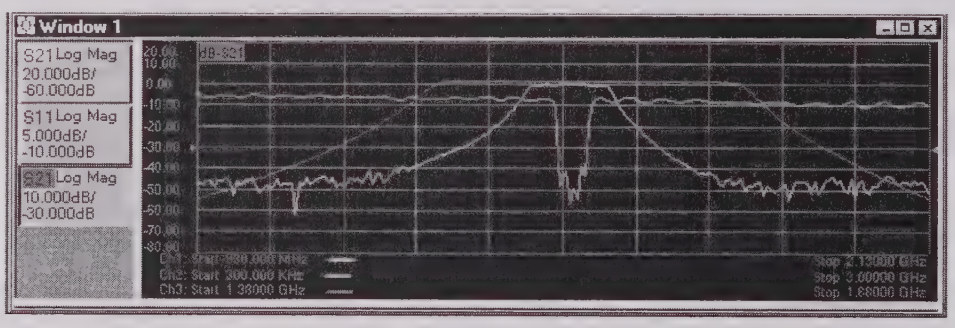
   The S11 trace is now displayed on the screen grid and indicated on the trace bar. Also notice that near the bottom of the Window 1 screen grid, channel 1 and channel 2 settings are displayed, along with a color indicator to quickly distinguish between the traces.



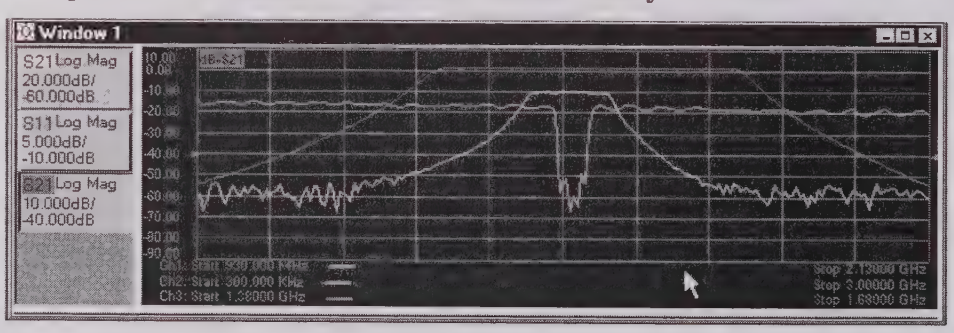

   Now, add another S21 measurement to the display. This S21 measurement is displayed in a narrow span on channel 3.

4. Press **Channel**, **F3** (**Ch 3**) to display a measurement trace on Channel 3.
5. Change the channel 3 trace to an S21 measurement by pressing **Measure**, **F2** (**S21**).
6. Change the channel 3 center frequency to 1.53 GHz and span to 300 MHz. From the **CHANNEL SETUP** block, press **Start/Center**, then press **F3** (**Center**). From the **ENTRY** block, press **1.53 G/n** to center the 1.53 GHz pass band. To set the span to 300 MHz, press **F4** (**Span**) and then press **300 M/μ**.
7. Scale the trace by pressing **Scale**, **F1** (**Autoscale**).

   Note that three measurement traces are displayed in Window 1. The trace bar indicates that there are two S21 measurements (one in wide and one in narrow span) and an S11 measurement. Also, near the bottom of Window 1, the three traces and their start/stop frequencies are listed along with their color indicator.



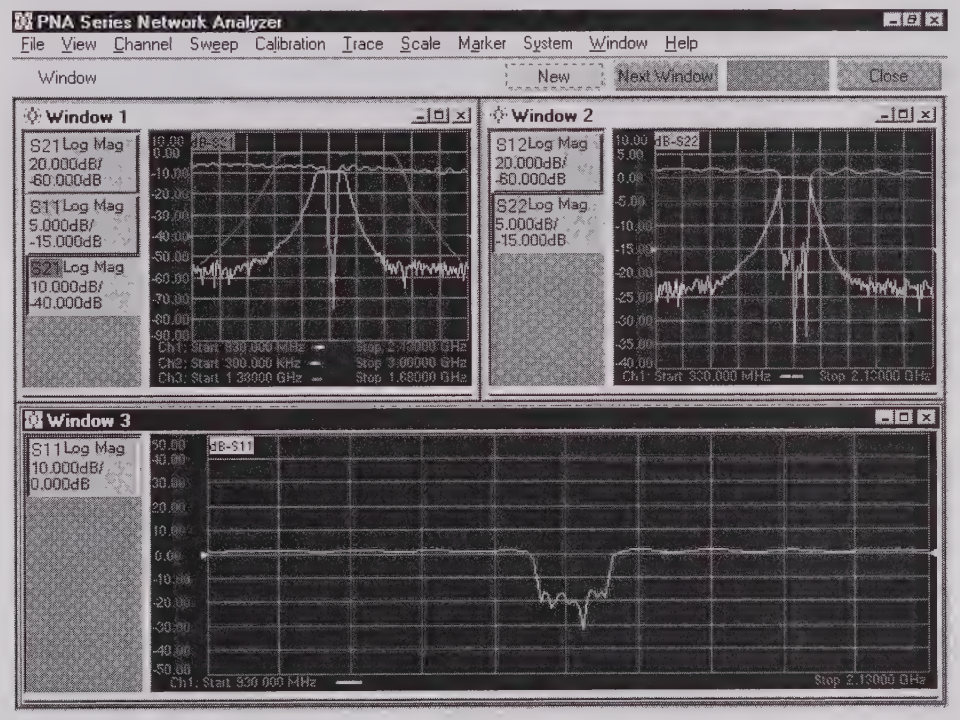

8. If the two S21 measurements are difficult to view, press **Scale**, **F3** (Ref Level) and turn the front panel knob until both traces can be seen clearly.



## Display a Third Window with a Different Format

This procedure displays two reflection measurement traces in a third Window. The two measurement traces are S11 and S22 displayed in Smith Chart Format.

1. Display a new window by pressing **Window**, **F1** (**New**).



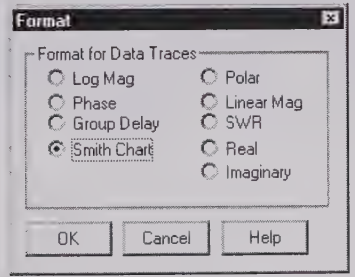

The first two windows are displayed side by side and Window 3, the new window, is displayed across the bottom of the screen grid.

2. *If the measurement in Window 3 is not already set up as an S11 measurement*, press **Measure**, **F1** (**S11**).

   Now, change the trace format in Window 3 from LogMag format to Smith Chart format.

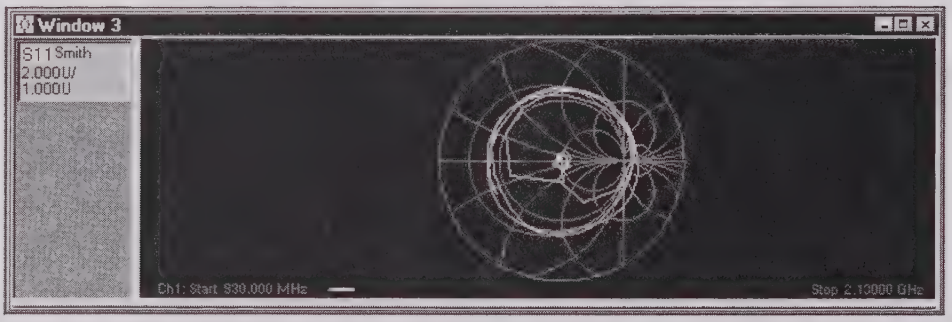
3. Press **Menu/Dialog**. Press Right Tab until the **Trace** menu is displayed. Press Down Arrow until **Format** is selected, then press **Click**.

4. In the **Format** window, press Down Arrow until **Smith Chart** is selected, then press **OK**.



5. Scale the trace by pressing **Scale**, **F1** (**Autoscale**).

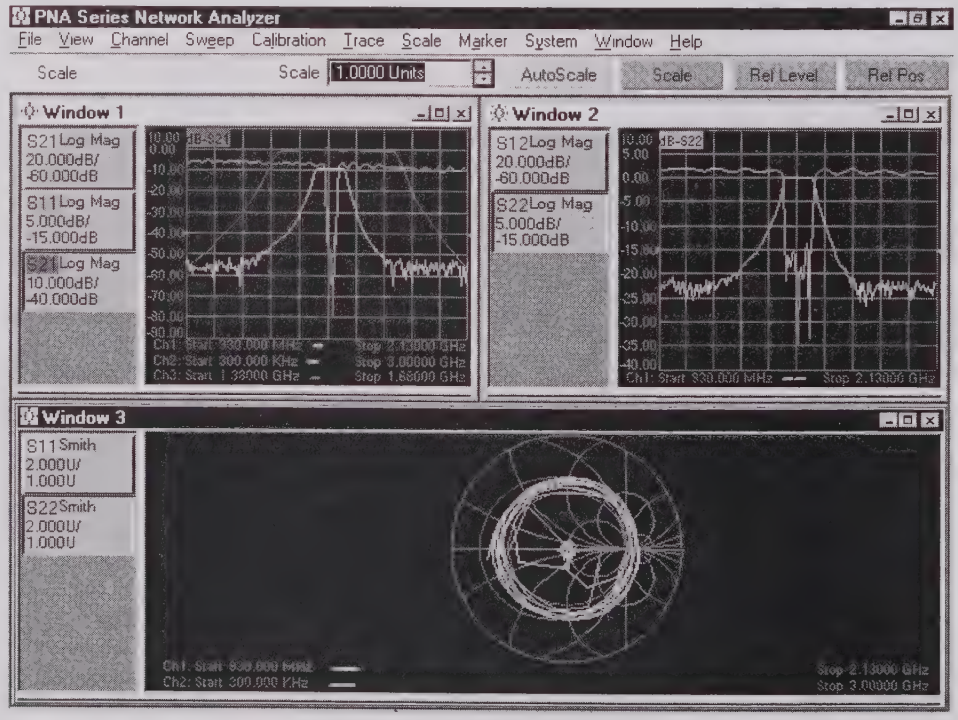
   The S11 measurement is now displayed in Smith chart format in Window 3.




   Now, add the second measurement, an S22 measurement to the window.

6. Display a new trace by pressing **Trace**, **F1** (**New**).
7. Set the measurement to S22 by pressing **Measure**, **F4** (**S22**).
8. Scale the trace by pressing **Scale**, **F1** (**Autoscale**).

   The S22 reflection measurement trace is now displayed in Window 3.

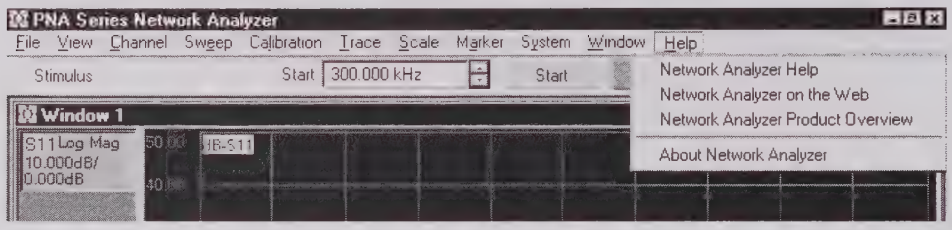


# 4 Becoming Familiar with Help

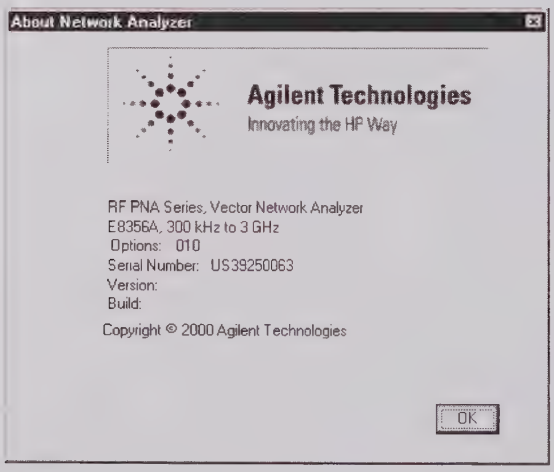
This chapter explains how to use the PNA Series RF Network Analyzer Help resources. The PNA Series RF Network Analyzer Help is provided in three distinct formats. These formats are:

- "Network Analyzer Product Overview" on page 4-3
- "Network Analyzer Help" on page 4-4
- "Network Analyzer Help on the Web" on page 4-13

These Help formats are accessed by clicking the desired format from the **Help** menu.

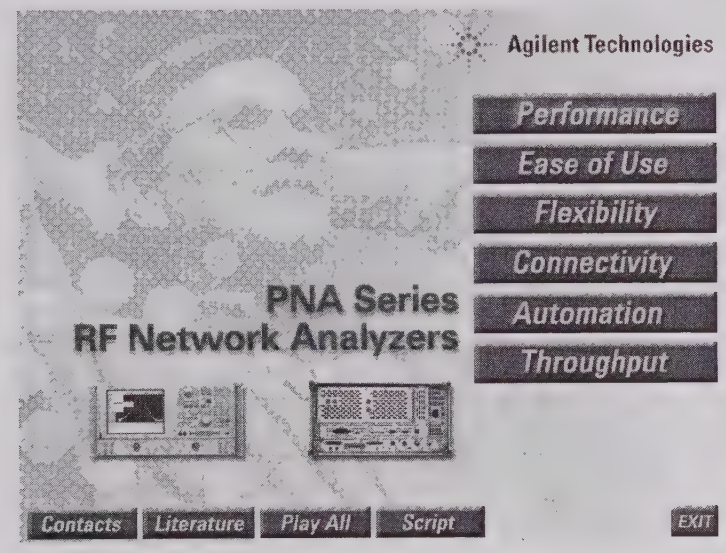



One additional feature of the **Help** menu is the **About Network Analyzer** window that displays specific information about your network analyzer. Although this window is not directly a part of the Help system, it contains information that you may need to know. The **About Network Analyzer** window is shown below.



# Network Analyzer Product Overview

The PNA Series RF Network Analyzers Product Overview is a multimedia presentation that will show you how the PNA series RF network analyzer can help you make the measurements that you need.




This presentation consists of six, self-contained topics related to the PNA series network analyzer. At any point during the presentation, you may stop the presentation and return to the main product overview screen. The total time for the entire presentation is approximately 20 minutes.

The six presentation topics are:

- Performance
- Ease of Use
- Flexibility
- Connectivity
- Automation
- Throughput

Start any topic by clicking the title with the mouse.

There are four additional selections to help you with the PNA series network analyzer:

**Contacts** provides a telephone number to contact an Agilent Technologies representative based on your geographical location.

**Literature** provides a list of PNA-series product literature and application notes for your use in pdf format.

**Play All** starts the PNA series multimedia presentation. The six topics are played consecutively.

**Script** displays the PNA series multimedia presentation script in pdf format.

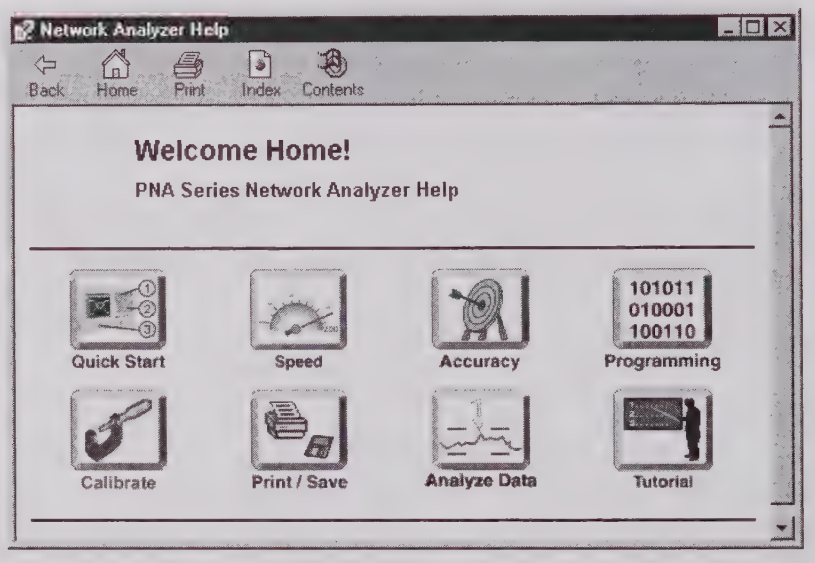
# Network Analyzer Help

The network analyzer help system contains five distinct ways of finding information about the PNA series network analyzer. The five ways of finding information are:

- Home Page
- Index (keyword search)
- Table of Contents
- Glossary
- Context-sensitive Help

## Using the Help Home Page to Find Information

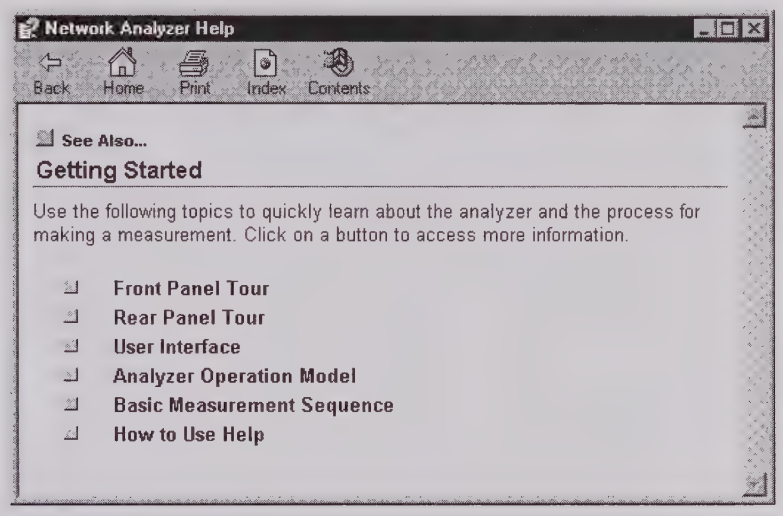
The Network Analyzer Help Home page is a good way to find information about general topics. Clicking one of the eight topics or icons listed on the Home page displays a page specific to that topic which lists even more specific information topics.




Each of the eight general topics is described throughout the remainder of this section.

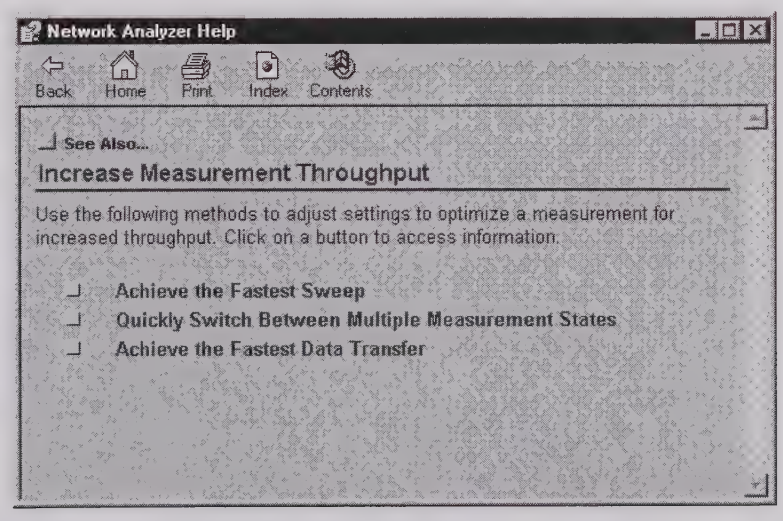
### Quick Start

The Quick Start selection presents information on getting started with the PNA series network analyzer. Click the box to the left of each topic to access the specific information of that topic.



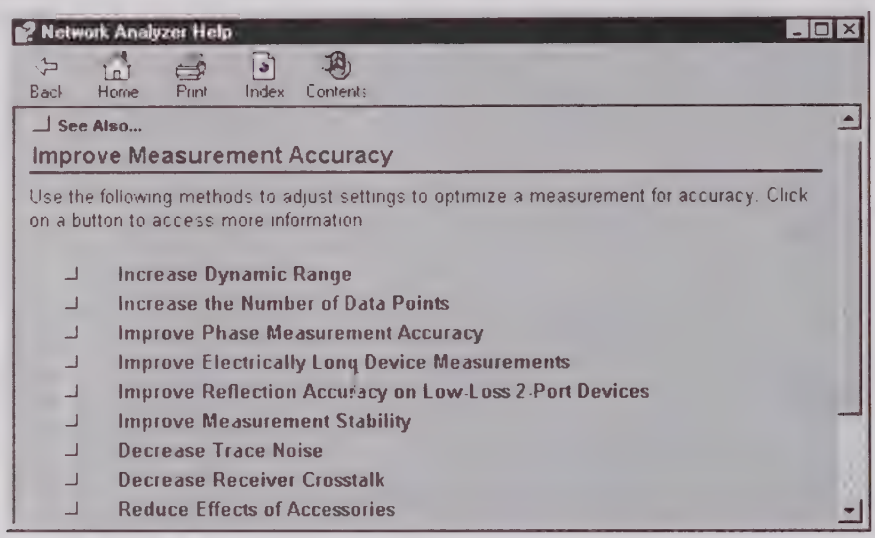

### Speed

The Speed selection presents information on increasing measurement throughput using the PNA series network analyzer. Click the box to the left of each topic to access the specific information of that topic.


Network Analyzer Help
Back
Home
Print
Index
Contents
See Also...
Increase Measurement Throughput
Use the following methods to adjust settings to optimize a measurement for increased throughput. Click on a button to access information.
Achieve the Fastest Sweep
Quickly Switch Between Multiple Measurement States
Achieve the Fastest Data Transfer

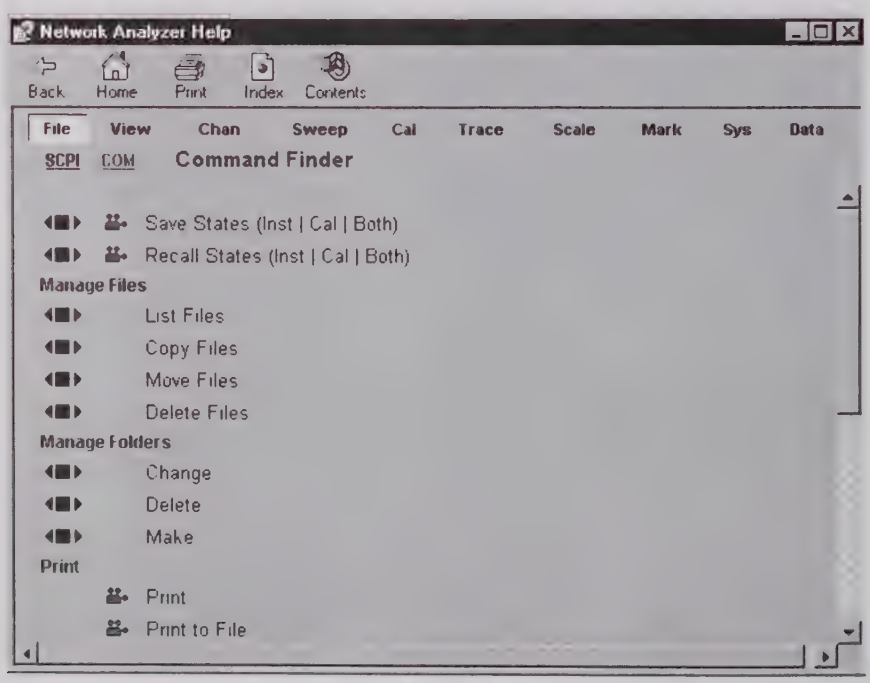
## Accuracy

The Accuracy selection presents information on improving measurement accuracy using the PNA series network analyzer. Click the box to the left of each topic to access the specific information of that topic.


Network Analyzer Help
Back
Home
Print
Index
Contents
See Also...
Improve Measurement Accuracy
Use the following methods to adjust settings to optimize a measurement for accuracy. Click on a button to access more information
Increase Dynamic Range
Increase the Number of Data Points
Improve Phase Measurement Accuracy
Improve Electrically Long Device Measurements
Improve Reflection Accuracy on Low-Loss 2-Port Devices
Improve Measurement Stability
Decrease Trace Noise
Decrease Receiver Crosstalk
Reduce Effects of Accessories

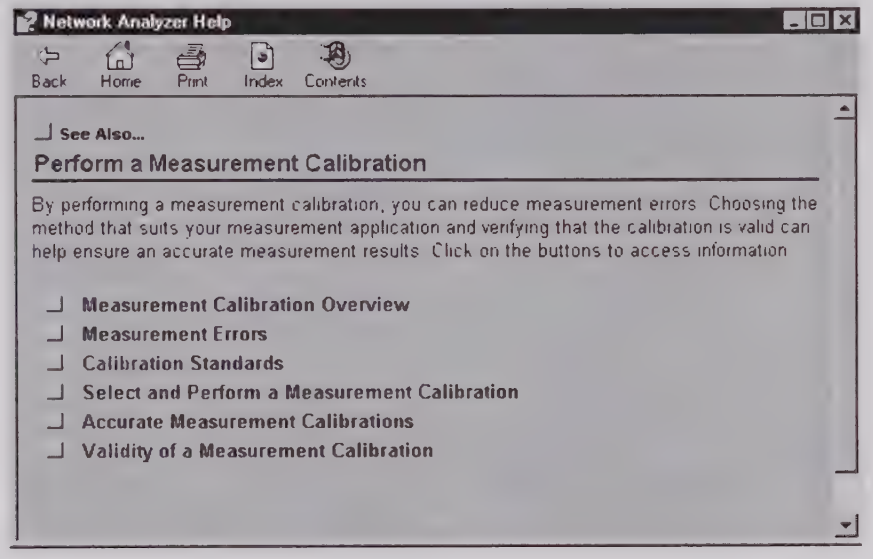
## Programming

The Programming selection presents information on programming the PNA series network analyzer using SCPI and COM commands. Click the indicator to the left of each topic, for SCPI commands and for COM commands, to access the specific information about that topic.



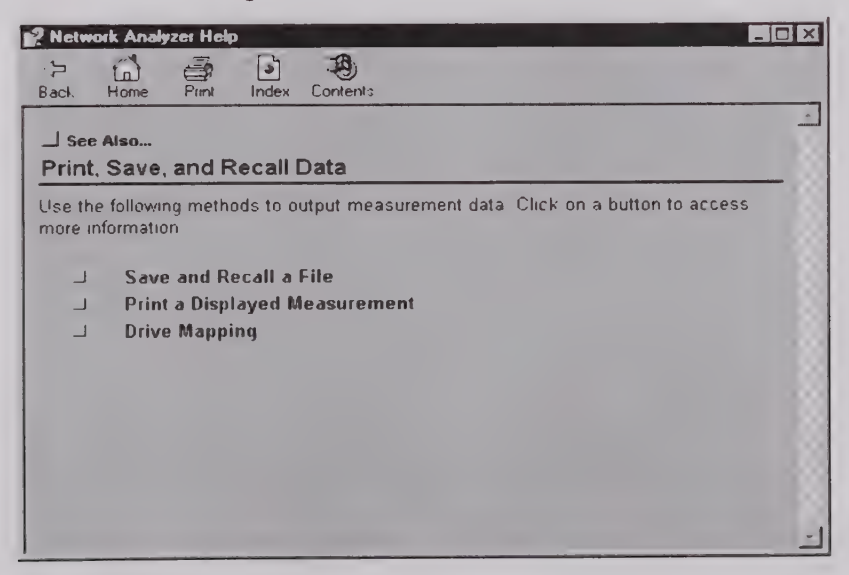
### Calibrate

The Calibrate selection presents information on performing a measurement calibration on the PNA series network analyzer. Click the box to the left of each topic to access the specific information of that topic.


Network Analyzer Help
Back
Home
Print
Index
Contents
See Also...
Perform a Measurement Calibration
By performing a measurement calibration, you can reduce measurement errors. Choosing the method that suits your measurement application and verifying that the calibration is valid can help ensure an accurate measurement results. Click on the buttons to access information
Measurement Calibration Overview
Measurement Errors
Calibration Standards
Select and Perform a Measurement Calibration
Accurate Measurement Calibrations
Validity of a Measurement Calibration

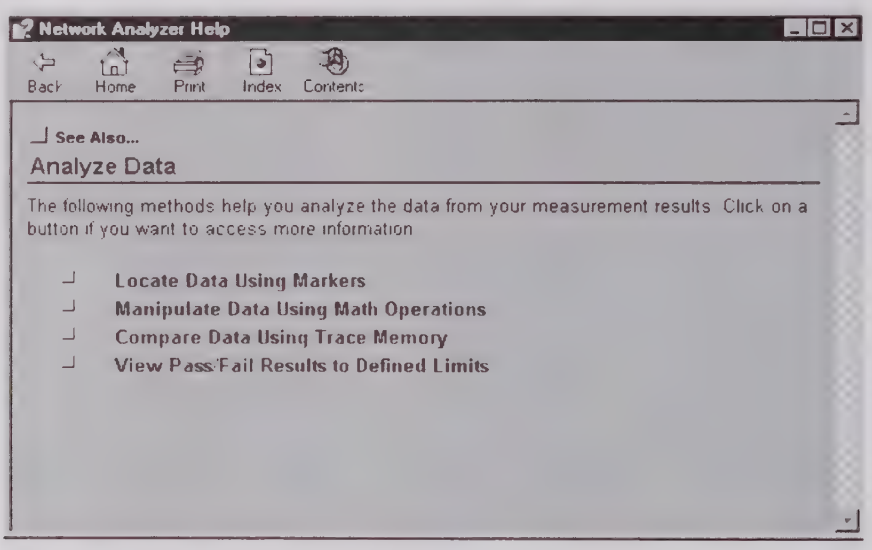
### Print/Save

The Print/Save selection presents information on printing, saving, and recalling data using the PNA series network analyzer. Click the box to the left of each topic to access the specific information of that topic.



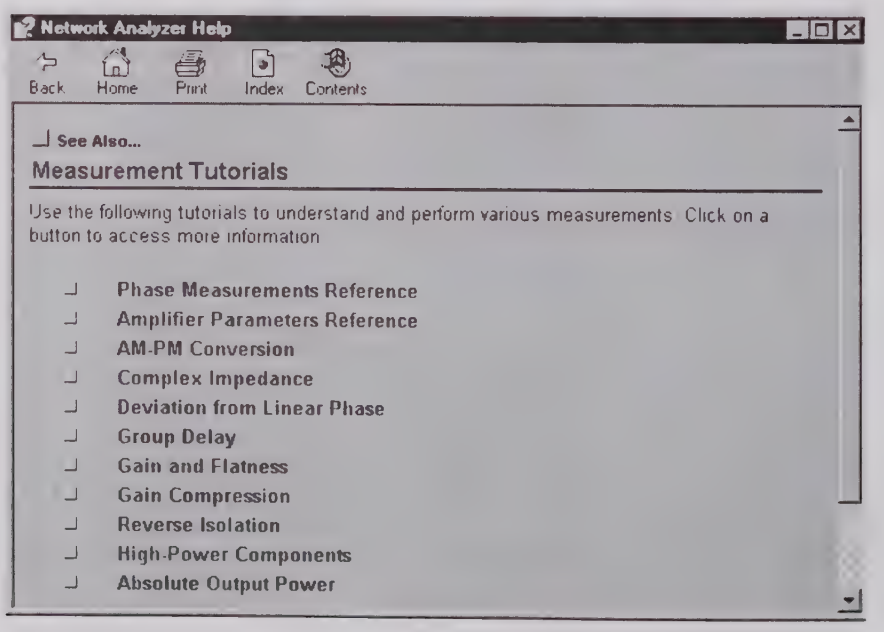
### Analyze Data

The Analyze Data selection presents information on analyzing data using the PNA series network analyzer. Click the box to the left of each topic to access the specific information of that topic.


Network Analyzer Help
Back
Home
Print
Index
Contents
See Also...
Analyze Data
The following methods help you analyze the data from your measurement results. Click on a button if you want to access more information.
Locate Data Using Markers
Manipulate Data Using Math Operations
Compare Data Using Trace Memory
View Pass/Fail Results to Defined Limits

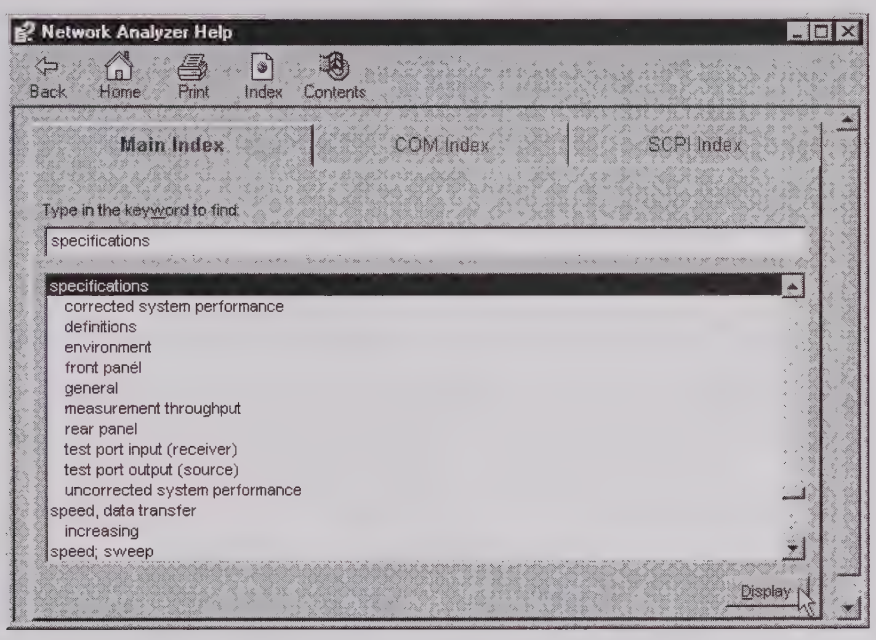
### Tutorial

The Tutorial selection presents information to help you understand and perform various network analyzer measurements. Click the box to the left of each topic to access the specific information of that topic.



## Using the Index (Keyword Search) to Find Information

Click **Index** on the Network Analyzer Help title bar to open the index. The index can also be opened by clicking the **Index** button at the top of the **Contents** window.

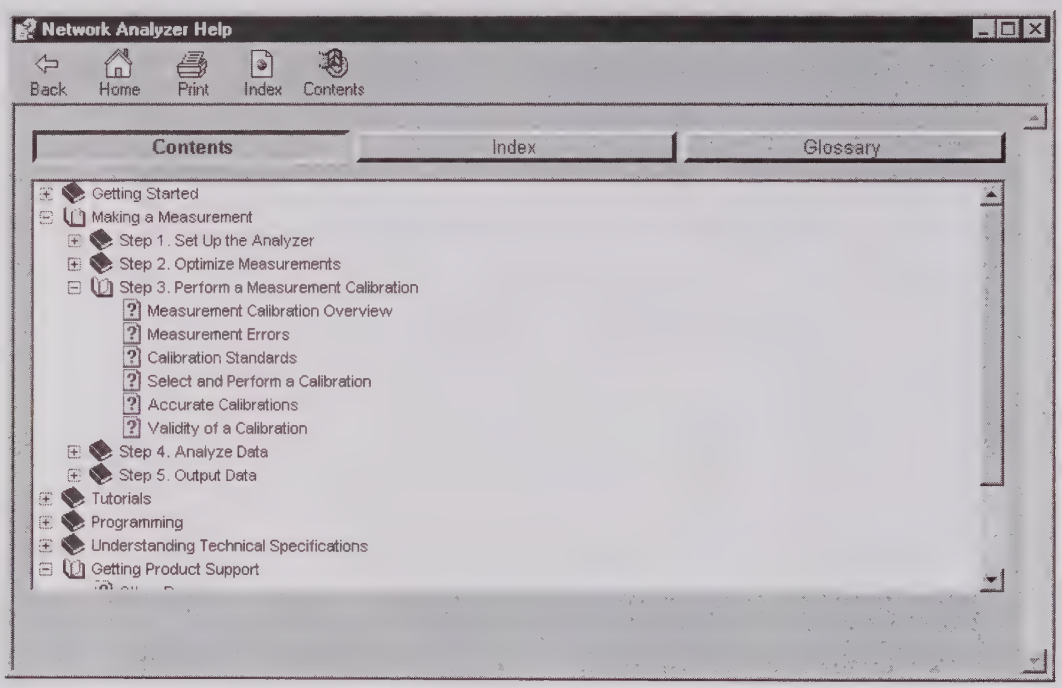



Find information using the index by typing a topic in the **Type in the keyword to find** box. Find and select the exact topic in the list of index topics displayed below the **Type in the keyword to find** box. Then, click **Display** to view the topic.

After clicking the **COM Index** tab or the **SCPI Index** tab at the top of the page, programming information can be found using the same method described above.

## Using Contents to Find Information

Click **Contents** on the Network Analyzer Help title bar to access the list of contents.

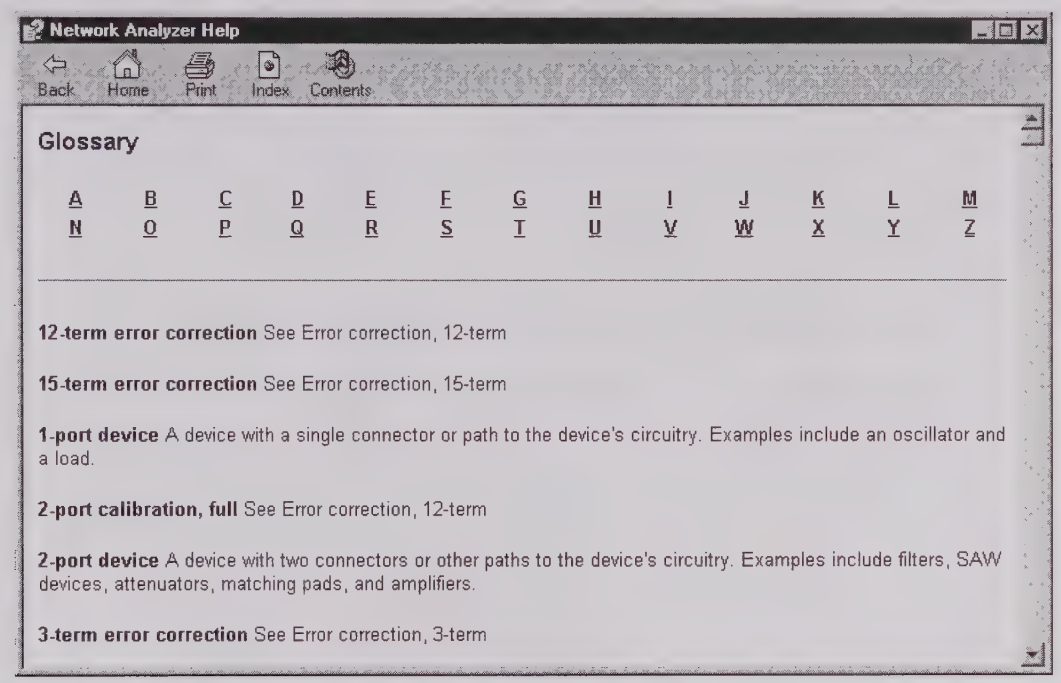



A list of contents is displayed listing the title of general topics. Each topic is preceded by an icon.

- **If the icon is a closed book**, double-click the icon to display a list of more specific topics related to the topic at the right of the icon. (This icon is preceded by a box containing "+" indicating there is information that is not displayed.)
- **If the icon is an open book**, double-click the icon to close the list of topics related to the topic at the right of the icon. (This icon is preceded by a box containing "–" indicating all information is displayed.)
- **If the icon is a page with a "?"**, double-click the icon to display specific information related to the topic at the right of the icon.

## Using the Glossary to Find Information

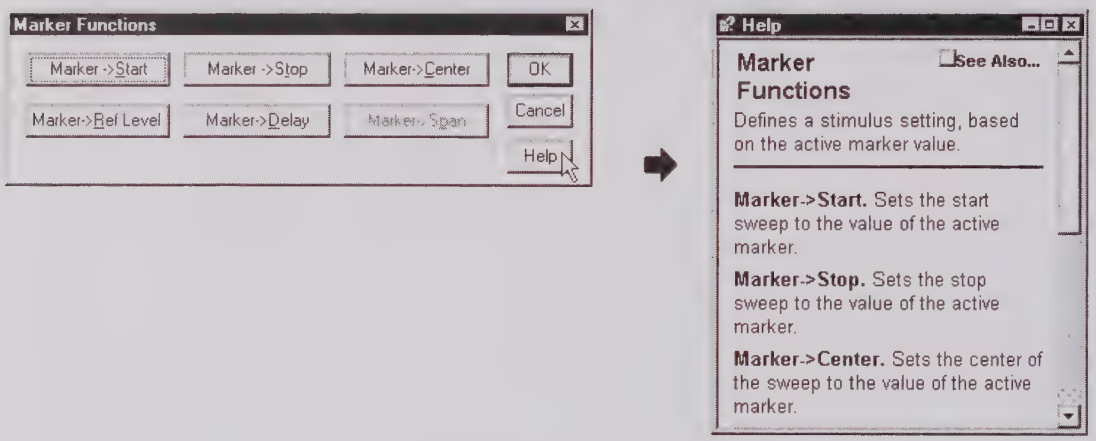
Double-click **Glossary** from the **Contents** list to open the glossary. The glossary can also be opened by clicking the **Glossary** button at the top of the **Contents** window.


Network Analyzer Help
Back
Home
Print
Index
Contents
Glossary
A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z
12-term error correction See Error correction, 12-term
15-term error correction See Error correction, 15-term
1-port device A device with a single connector or path to the device's circuitry. Examples include an oscillator and a load.
2-port calibration, full See Error correction, 12-term
2-port device A device with two connectors or other paths to the device's circuitry. Examples include filters, SAW devices, attenuators, matching pads, and amplifiers.
3-term error correction See Error correction, 3-term

From the list of letters across the top of the **Glossary** page, click a letter to access glossary terms that begin with that letter. You may also scroll through the list using the scroll bar on the right.

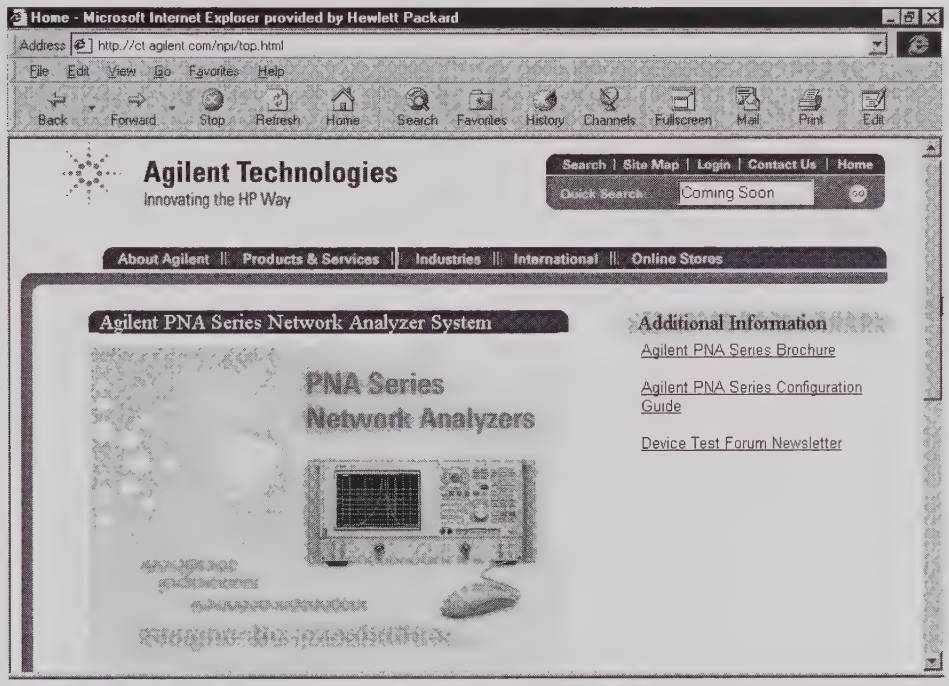
## Using the Context-sensitive Help to Find Information

Click **Help** in any network analyzer window, to access the context-sensitive Help information. Clicking **Help** presents information related to the window. If related information is available, you may click **See Also** in the **Help** window.



# Network Analyzer Help on the Web

The Agilent PNA Series Network Analyzer System Web page is another resource for help with the network analyzer.


Home - Microsoft Internet Explorer provided by Hewlett Packard
Address http://ct.agilent.com/npi/top.html
File Edit View Go Favorites Help
Back Forward Stop Refresh Home Search Favorites History Channels Fullscreen Mail Print Edit
Agilent Technologies
Innovating the HP Way
Search | Site Map | Login | Contact Us | Home
Quick Search: Coming Soon
About Agilent | Products & Services | Industries | International | Online Stores
Agilent PNA Series Network Analyzer System
PNA Series
Network Analyzers
Additional Information
Agilent PNA Series Brochure
Agilent PNA Series Configuration Guide
Device Test Forum Newsletter

This Web page has links to:

- Web pages for each PNA series network analyzer product

  These Web pages describe and list the features of the specific network analyzer.

- Equipment used by PNA series network analyzers

  This equipment includes:

  — Accessories
  — Cables
  — Calibration and Verification Kits

- Literature related to PNA series network analyzers

  This literature is in pdf format and includes:

  — PNA Series Network Analyzer Product Brochure
  — PNA Series Network Analyzer Configuration Guide
  — Device Test Forum Newsletter

The Web page also has links to the rest of the Agilent Technologies Web site where you can find a variety of information. Some topics include online manuals, service notes, product information, and training that is being offered.

# 5 Safety and Regulatory Information

This chapter provides safety information that will help protect you and your network analyzer. It also contains information that is required by various government regulatory agencies. General information is also listed in this chapter which includes information about cleaning, finding assistance with repairs, and information that you will need to ship your network analyzer to Agilent Technologies for repair.

# General Information

This section includes information about cleaning, finding assistance with repairs, and information that you will need to ship your network analyzer to Agilent Technologies for repair.

## Maintenance

To remove dirt or dust from the external case of the network analyzer, clean the case using a dry or slightly-dampened cloth only.

**WARNING** **To prevent electrical shock, disconnect the Agilent Technologies E8356A/E8357A/E8358A from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.**

## Assistance

*Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products.*

*For any assistance, contact your nearest Agilent Technologies Sales and Service Office. Refer to Table 5-1 on page 5-4.*

## Shipment for Service

If you are sending the instrument to Agilent Technologies for service, ship the analyzer to the nearest Agilent Technologies service center for repair, including a description of any failed test and any error message. Refer to Table 5-1 for a list of Agilent Technologies sales and service offices.

Ship the analyzer using the original or comparable antistatic packaging materials.

## Table 5-1 Agilent Technologies Sales and Service Offices

| UNITED STATES | | |
|---|---|---|
| Instrument Support Center<br>Agilent Technologies Company<br>(800) 403-0801 | | |
| **EUROPEAN FIELD OPERATIONS** | | |
| Headquarters<br>Agilent Technologies S.A.<br>150, Route du Nant-d'Avril<br>1217 Meyrin 2/ Geneva<br>Switzerland<br>(41 22) 780.8111 | France<br>Agilent Technologies France<br>1 Avenue Du Canada<br>Zone D'Activite De<br>Courtaboeuf<br>F-91947 Les Ulis Cedex<br>France<br>(33 1) 69 82 60 60 | Germany<br>Agilent Technologies GmbH<br>Agilent Technologies Strasse<br>61352 Bad Homburg v.d.H<br>Germany<br>(49 6172) 16-0 |
| Great Britain<br>Agilent Technologies Ltd.<br>Eskdale Road, Winnersh<br>Triangle Wokingham, Berkshire<br>RG41 5DZ England<br>(44 118) 9696622 | | |
| **INTERCON FIELD OPERATIONS** | | |
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| China<br>China Agilent Technologies Co.<br>38 Bei San Huan X1 Road<br>Shuang Yu Shu<br>Hai Dian District<br>Beijing, China<br>(86 1) 256-6888 | | |

## Safety Symbols

The following safety symbols are used throughout this manual. Familiarize yourself with each of the symbols and its meaning before operating this instrument.

| | |
|---|---|
| **CAUTION** | Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, would result in damage to or destruction of the product. Do not proceed beyond a caution note until the indicated conditions are fully understood and met. |

| | |
|---|---|
| **WARNING** | **Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.** |

# General Safety Considerations

## Safety Earth Ground

**WARNING** **This is a Safety Class I Product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the product, is likely to make the instrument dangerous. Intentional interruption is prohibited.**

**CAUTION** Always use the three-prong AC power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage.

## Before Applying Power

**WARNING** **If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.**

**WARNING** **If an instrument handle is damaged, you should replace it immediately. Damaged handles can break while you are moving or lifting the instrument and cause personal injury or damage to the instrument.**

**CAUTION** This instrument has autoranging line voltage input. Be sure the supply voltage is within the specified range.

**CAUTION** This product is designed for use in Installation Category II and Pollution Degree 2 per IEC 1010 and 664 respectively.

**CAUTION** **Ventilation Requirements:** When installing the product in a cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the instrument by 4 °C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.

## Servicing

| | |
|---|---|
| WARNING | **These servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.** |

| | |
|---|---|
| WARNING | **No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.** |

| | |
|---|---|
| WARNING | **The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.** |

| | |
|---|---|
| WARNING | **The power cord is connected to internal capacitors that may remain live for 5 seconds after disconnecting the plug from its power supply.** |

# Regulatory Information

This section contains information that is required by various government regulatory agencies.

## Instructions for Use

This product has been designed and tested in accordance with IEC Publication 1010, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. The instruction documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

Install the instrument so that the detachable power cord is readily identifiable and is easily reached by the operator.

The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. **The front panel switch is only a standby switch and is not a LINE switch (disconnecting device).**

An externally installed switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be used as a disconnecting device.

## Instrument Markings

The instruction documentation symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the documentation.

The CE mark is a registered trademark of the European Community.

The CSA mark is a registered trademark of the Canadian Standards Association.

The C-Tick mark is a registered trademark of the Australian Spectrum Management Agency.

ISM1-A

This is a symbol of an Industrial Scientific and Medical Group 1 Class A product.

The ON, OFF, and STANDBY symbols are used to mark the positions of the instrument power line switch. The AC symbol is used to indicate the required nature of the line module input power.

| | | | |
|---|---|---|---|
|  | ON symbol |  | ON symbol |
| | STANDBY symbol | | OFF symbol |
| | OFF symbol |  | AC (alternating current) symbol |

## Declaration of Conformity

# DECLARATION OF CONFORMITY

According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014

| | |
|---|---|
| **Manufacturer's Name**: | Agilent Technologies, Inc. |
| **Manufacturer's Address:** | 1400 Fountaingrove Parkway<br>Santa Rosa, CA 95403-1799<br>USA |

Declares that the products

| | |
|---|---|
| **Product Name:** | PNA Series RF Network Analyzer |
| **Model Number:** | E8356A, E8357A, E8358A |
| **Product Options:** | This declaration covers all options of the above products. |

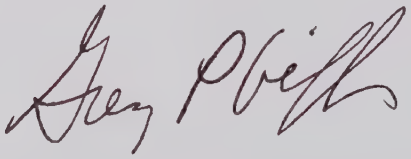
Conform to the following product specifications:

EMC: IEC 61326-1:1997+A1:1998 / EN 61326-1:1997+A1:1998

| Standard | Limit |
|---|---|
| CISPR 11:1990 / EN 55011-1991 | Group 1, Class A |
| IEC 61000-4-2:1995+A1998 / EN 61000-4-2:1995 | 4 kV CD, 8 kV AD |
| IEC 61000-4-3:1995 / EN 61000-4-3:1995 | 3 V/m, 80 - 1000 MHz |
| IEC 61000-4-4:1995 / EN 61000-4-4:1995 | 0.5 kV sig., 1 kV power |
| IEC 61000-4-5:1995 / EN 61000-4-5:1996 | 0.5 kV L-L, 1 kV L-G |
| IEC 61000-4-6:1996 / EN 61000-4-6:1998 | 3 V, 0.15 – 80 MHz |
| IEC 61000-4-11:1994 / EN 61000-4-11:1998 | 1 cycle, 100% |

Safety: IEC 61010-1:1990 + A1:1992 + A2:1995 / EN 61010-1:1993 +A2:1995
CAN/CSA-C22.2 No. 1010.1-92

**Supplementary Information:**
The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC and carry the CE-marking accordingly.



Santa Rosa, CA, USA 18 August 2000

Greg Pfeiffer/Quality Engineering Manager

For further information, please contact your local Agilent Technologies sales office, agent or distributor.

## Compliance with German Noise Requirements

This is to declare that this instrument is in conformance with the German Regulation on Noise Declaration for Machines (Laermangabe nach der Maschinenlaermrerordung –3.GSGV Deutschland).

| **Acoustic Noise Emission/Geraeuschemission** | |
|---|---|
| LpA<70 dB | Lpa<70 dB |
| Operator Position | am Arbeitsplatz |
| Normal Operation | normaler Betrieb |
| per ISO 7779 | nach DIN 45635 t. 19 |

**Agilent Technologies**

Should one of your instruments need repair, the service organization is ready to serve you. However, you can help us serve you more effectively. When sending an instrument to Agilent for repair, please fill out this card and attach it to the product. Increased repair efficiency and reduced turn-around time should result.

COMPANY

ADDRESS

TECHNICAL CONTACT PERSON

PHONE NO. EXT.

MODEL NO. SERIAL NO.

MODEL NO. SERIAL NO.

P.O. NO. DATE

Accessories returned with unit

☐ NONE ☐ CABLE(S)

☐ POWER CABLE ☐ ADAPTER(S)

OTHER

over

**Agilent Technologies**

Should one of your instruments need repair, the service organization is ready to serve you. However, you can help us serve you more effectively. When sending an instrument to Agilent for repair, please fill out this card and attach it to the product. Increased repair efficiency and reduced turn-around time should result.

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MODEL NO. SERIAL NO.

P.O. NO. DATE

Accessories returned with unit

☐ NONE ☐ CABLE(S)

☐ POWER CABLE ☐ ADAPTER(S)

OTHER

over

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TECHNICAL CONTACT PERSON

PHONE NO. EXT.

MODEL NO. SERIAL NO.

MODEL NO. SERIAL NO.

P.O. NO. DATE

Accessories returned with unit

☐ NONE ☐ CABLE(S)

☐ POWER CABLE ☐ ADAPTER(S)

OTHER

over

ect o

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MODEL NO. SERIAL NO.

MODEL NO. SERIAL NO.

P.O. NO. DATE

Accessories returned with unit

☐ NONE ☐ CABLE(S)

☐ POWER CABLE ☐ ADAPTER(S)

OTHER

over

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PHONE NO. EXT.

MODEL NO. SERIAL NO.

MODEL NO. SERIAL NO.

P.O. NO. DATE

Accessories returned with unit

☐ NONE ☐ CABLE(S)

☐ POWER CABLE ☐ ADAPTER(S)

OTHER

over

-10

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COMPANY

ADDRESS

TECHNICAL CONTACT PERSON

PHONE NO. EXT.

MODEL NO. SERIAL NO.

MODEL NO. SERIAL NO.

P.O. NO. DATE

Accessories returned with unit

☐ NONE ☐ CABLE(S)

☐ POWER CABLE ☐ ADAPTER(S)

OTHER

over

Service needed

☐ CALIBRATION ONLY
☐ REPAIR ☐ REPAIR & CAL

OTHER_____

_____

Observed symptoms/problems

FAILURE MODE IS:

☐ CONSTANT ☐ INTERMITTENT

SENSITIVE TO:

☐ COLD ☐ HEAT ☐ VIBRATION

FAILURE SYMPTOMS/SPECIAL CONTROL SETTINGS _____

_____

_____

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_____

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_____

If unit is part of system list model number(s) of other interconnected instruments._____

_____

_____



Service needed

☐ CALIBRATION ONLY
☐ REPAIR ☐ REPAIR & CAL

OTHER_____

_____

Observed symptoms/problems

FAILURE MODE IS:

☐ CONSTANT ☐ INTERMITTENT

SENSITIVE TO:

☐ COLD ☐ HEAT ☐ VIBRATION

FAILURE SYMPTOMS/SPECIAL CONTROL SETTINGS _____

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If unit is part of system list model number(s) of other interconnected instruments._____

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5955-8108 Printed in U.S.A.

Service needed

☐ CALIBRATION ONLY
☐ REPAIR ☐ REPAIR & CAL

OTHER_____

_____

Observed symptoms/problems

FAILURE MODE IS:

☐ CONSTANT ☐ INTERMITTENT

SENSITIVE TO:

☐ COLD ☐ HEAT ☐ VIBRATION

FAILURE SYMPTOMS/SPECIAL CONTROL SETTINGS _____

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If unit is part of system list model number(s) of other interconnected instruments._____

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5955-8108 Printed in U.S.A.

Service needed

☐ CALIBRATION ONLY
☐ REPAIR ☐ REPAIR & CAL

OTHER_____

_____

Observed symptoms/problems

FAILURE MODE IS:

☐ CONSTANT ☐ INTERMITTENT

SENSITIVE TO:

☐ COLD ☐ HEAT ☐ VIBRATION

FAILURE SYMPTOMS/SPECIAL CONTROL SETTINGS _____

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If unit is part of system list model number(s) of other interconnected instruments._____

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5955-8108 Printed in U.S.A.

Service needed

☐ CALIBRATION ONLY
☐ REPAIR ☐ REPAIR & CAL

OTHER_____

_____

Observed symptoms/problems

FAILURE MODE IS:

☐ CONSTANT ☐ INTERMITTENT

SENSITIVE TO:

☐ COLD ☐ HEAT ☐ VIBRATION

FAILURE SYMPTOMS/SPECIAL CONTROL SETTINGS _____

_____

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_____

If unit is part of system list model number(s) of other interconnected instruments._____

_____

_____

5955-8108 Printed in U.S.A.

Service needed

☐ CALIBRATION ONLY
☐ REPAIR ☐ REPAIR & CAL

OTHER_____

_____

Observed symptoms/problems

FAILURE MODE IS:

☐ CONSTANT ☐ INTERMITTENT

SENSITIVE TO:

☐ COLD ☐ HEAT ☐ VIBRATION

FAILURE SYMPTOMS/SPECIAL CONTROL SETTINGS _____

_____

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_____

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If unit is part of system list model number(s) of other interconnected instruments._____

_____

_____

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# Index


**Symbols**

+/- key, 2-11
. key, 2-11

**Numerics**

015, Option (configurable test set), 2-4
10 MHz reference
  input connector, 2-12
  output connector, 2-13
1CM, Option (rack mount kit without handles), 1-5, 1-13
1CP, Option (rack mount kit with handles), 1-5, 1-10

**A**

About Network Analyzer, 4-2
absolute output power, 4-8
AC
  input, 2-13
  power cord, 1-4, 1-6, 1-24
  symbol, 5-9
access levels, 1-40
accessory
  information, 4-13
  part numbers, 1-4
  reducing the effect of an, 4-6
accuracy, 4-6
  calibration, 4-7
active entry toolbar, 2-6
adapter, parallel port, 1-4
adding new users, 1-37–1-44
administrative tasks, 1-30
administrator
  description, 1-40
  password, 1-26
Agilent
  address, 5-4
  telephone number, 4-3, 5-4
  Web site, 4-13
agreement, licence, 1-25
altitude, 1-6
amplifier parameters, 4-8
AM-PM conversion, 4-8
analyzing data, 4-8
application notes, 4-3
Arrange key, 2-9
assistance, 5-3
automatic log on, 1-42
automation, 4-3
autoscale, 3-13, 3-29
autoscale all, 3-13
auxiliary
  I/O connector, 2-14
  output connectors, 2-4
Average key, 2-9

**B**

backspace key, 2-11
backup
  user description, 1-40
  window, opening the, 1-32
bandwidth, setting IF, 3-6, 3-24
basic measurements, 4-5
before applying power, 5-6
bench top set up, 1-8
brochures, 4-13

**C**

cable
  AC power, 1-4
  external trigger, 1-4
  information, 4-13
Cal key, 2-9
calibrate, 4-7
calibration
  data, saving, 3-11, 3-28
  kit, 3-9, 3-26, 4-13
  performing a, 3-8–3-11, 3-25–3-28
  standards, 4-7
    measuring, 3-10, 3-27
  type, 3-8, 3-25
  validity, 4-7
  wizard, 3-8, 3-25
Cancel key, 2-9
cautions, 5-5
CD-ROM, 1-4
CD-ROM drive, 1-5
CE mark, 5-9
center frequency
  entering, 3-5, 3-23
changing display formats, 3-18–3-20, 3-33–3-34
channel attributes, 3-2
Channel key, 2-9
Channel Setup keys, 2-9
channels, multiple measurement, 3-15–3-17, 3-31–3-32
check, operator's, 1-45
cleaning, 5-3
Click key, 2-8
COM index, 4-9
COM programming Help, 4-6
COM1 connector, 2-13
Command keys, 2-9
comparing data, 4-8
complex impedance, 4-8
compression, gain, 4-8
computer name, 1-26
configurable test set option, 2-4
configuration guide, 4-13
connecting USB accessories, 1-16–1-22
connectivity, 4-3
connectors, rear panel, 2-12–2-14
contents, Help table of, 4-10
context-sensitive Help, 4-12
Control Panel, opening, 1-37
conversion, AM-PM, 4-8
cover, removing, 5-7
crosstalk, 4-6
CSA mark, 5-9
C-Tick mark, 5-9

**D**

dangerous voltage, 5-7
data
  analyzing, 4-8
  comparing, 4-8
  fast transfer, 4-5
  manipulating, 4-8
  points, increasing the number of, 4-6
  printing, 4-7
  recalling, 4-7
  saving, 4-7
  saving calibration, 3-11, 3-28
date, setting the, 1-27
daylight savings time, 1-27
decimal key, 2-11
declaration of conformity, 5-10
definition of terms, 4-11
delay, group, 4-8
disk
  drive, 2-4
    mapping a, 4-7
  emergency repair, 1-31
  inserting a floppy, 1-33
  removing a floppy, 1-34
display, 2-4, 2-6–2-7
  features, 2-2
  formats, 3-19, 3-33
Display keys, 2-9
displaying multiple measurement channels, 3-15–3-17, 3-31–3-32
down arrow key, 2-8
dynamic range, 4-6

**E**

earth ground, 1-6, 5-6
ease of use, 4-3
ECAL module, connecting an, 1-19
electrical requirements, 1-6
electrically long devices, 4-6
emergency repair disk
  creating, 1-31–1-36
Enter key, 2-11
Entry keys, 2-11

environmental requirements, 1-6
external
  AM input connector, 2-12
  detector input connector, 2-12
  trigger cable, 1-4

F

F1, F2, F3, F4 keys, 2-8
fast data transfer, 4-5
fast sweep, 4-5
find data, 4-8
firmware version, 4-2
flange kit, 1-5
  installation, 1-10, 1-13
flatness, 4-8
flexibility, 4-3
floppy disk drive, 2-4
Format key, 2-10
formats
  changing display, 3-18—3-20, 3-33—3-34
  display, 3-19, 3-33
frequency
  entering a, 3-5, 3-23
  terminator, 3-5
front panel, 2-4, 2-4—2-11
  display, 2-6—2-7
  features, 2-2
  keys, 2-8—2-11
  knob, 2-11
  tour, 4-5

G

G/n key, 2-11
gain, 4-8
gain compression, 4-8
general purpose interface bus. See GPIB
general safety considerations, 5-6
German noise requirements, 5-11
glossary, 4-11
GPIB connector, 2-14
graticule, 2-7
ground, 1-6
  safety earth, 5-6
group delay, 4-8
guest description, 1-40

H

handle
  damaged, 1-8, 1-11, 5-6
  installation, 1-8, 1-10
  kit part number, 1-4
Help
  button, 4-12
  context-sensitive, 4-12
  glossary, 4-11
  homepage, 4-4
  how to use, 4-5
  index, 4-9
  key, 2-9
  on the Web, 4-13
  printed version, 1-5
  starting, 4-2
  table of contents, 4-10
hibernate, 2-4
hibernation, 1-23
high-power components, 4-8
hub, 1-5
  connecting a USB, 1-19, 1-20
  USB, 1-16
humidity, 1-6

I

IF bandwidth, setting, 3-6, 3-24
impedance, 4-8
index, Help system, 4-9
inserting a disk into the disk drive, 1-33
instruction documentation symbol, 5-9
instrument markings, 5-9
ISM1-A mark, 5-9
isolation, reverse, 4-8

K

keyboard, 1-4
  connecting a USB, 1-17, 1-21
keypad, 2-4, 2-8—2-11
  features, 2-2
keyword search, 4-9
kits, calibration and verification, 4-13
knob, front panel, 2-11

L

LAN
  computer name, 1-26
  connector, 2-13
left tab key, 2-8
licence agreement, 1-25
Limit Table key, 2-10
limits, defined, 4-8
linear phase deviation, 4-8
literature, product, 4-3
local area network. See LAN
locate data, 4-8
logging on, 1-25—1-28
  automatically, 1-42
  without passwords, 1-42

M

M/u key, 2-11
Macro/Local key, 2-10
main index, 4-9
maintenance, 5-3
  agreement, 5-3
manipulating data, 4-8
manuals, online, 4-13
mapping a disk drive, 4-7
Marker Function key, 2-10
Marker key, 2-10
Marker Search key, 2-10
Marker Table key, 2-10
marker toolbar, 2-7
markers, using, 4-8
math operations, 4-8
Math/Memory key, 2-10
Measure key, 2-10
Measure Setups key, 2-9
measurement
  calibration, 4-7
  errors, 4-7
  multiple channels, 3-15—3-17, 3-31—3-32
  selecting, 3-4, 3-22
  toolbar, 2-7
  windows, opening, 3-12—3-14, 3-29—3-30
measurements
  basic, 4-5
  making basic, 3-2
  using a mouse and keyboard, 3-3—3-20
  using the keypad, 3-21—3-34
mechanical calibration kit, 3-9, 3-26
memory, trace, 4-8
menu titles, 2-6
Menu/Dialog key, 2-9
minimizing the network analyzer application, 1-31
model number, 4-2
mouse, 1-4
  connecting a USB, 1-17, 1-21
multimedia presentation, 4-3

N

name, computer, 1-26
Navigation keys, 2-8
network analyzer application
  minimizing, 1-31, 1-37
  restoring, 1-35
new users, adding, 1-37—1-44
newsletter, 4-13
noise requirements, 5-11
noise, trace, 4-6
numeric keys, 2-11

# Index


**O**

OFF symbol, 5-9
offices, sales and service, 5-4
OK key, 2-9
ON symbol, 5-9
On/Off switch, 1-23, 1-24, 2-4
online manuals, 4-13
opening
  Help, 4-2
  measurement windows, 3-12—3-14, 3-29—3-30
operator's check, 1-45
  results, 1-47
Option, 2-4
  015, configurable test set, 2-4
  1CM
    installation, 1-13—1-15
    rack mount kit without handles, 1-5, 1-13
  1CP
    installation, 1-10—1-12
    rack mount kit with handles, 1-5, 1-10
optional equipment, 1-5
options, display of built-in, 4-2
output power, absolute, 4-8
overview, 4-3

**P**

packaging materials, 5-3
parallel
  interface port connector, 2-13
  port adapter, 1-4
part numbers, accessory, 1-4
pass/fail results, 4-8
password
  administrator, 1-26
  entering a user, 1-40
  logging on without a, 1-42
performance, 4-3
phase
  deviation, 4-8
  measurement accuracy, 4-6
  measurements, 4-8
plus/minus backspace key, 2-11
port features, 2-4
power
  cord, 1-4, 1-6, 1-24
  down, 1-23
  supply, 5-8
  switch, 2-4
  user description, 1-40
Power key, 2-9
Preset key, 2-10
preset the analyzer, 3-3, 3-21
Print key, 2-10
printed version of help, 1-5
printing, 4-7
probe power connector, 2-4
product
  information, 4-13
  overview, 4-3
program
  minimizing the analyzer, 1-31, 1-37
  restoring the analyzer, 1-35
programming, 4-6
  index, 4-9

**Q**

quick start, 4-5

**R**

rack mount
  flange kit, 1-5
  rail set, 1-5
  the analyzer, 1-10—1-12, 1-13—1-15
rail set, 1-5
  installation, 1-10, 1-13
rear panel
  connectors, 2-12—2-14
  features, 2-2
  tour, 4-5
Recall key, 2-10
recalling data, 4-7
receiver crosstalk, 4-6
reference level, setting, 3-5, 3-23
reflection accuracy, 4-6
regulatory information, 5-8
removing
  disk from the disk drive, 1-34
  the cover, 5-7
repair disk, 1-31
replicator description, 1-40
requirements, electrical and environmental, 1-6
Restore Up/Down key, 2-10
restoring the network analyzer application, 1-35
restricted user description, 1-40
reverse isolation, 4-8
right tab key, 2-8
running the operator's check, 1-45—1-47

**S**

safety
  considerations, 5-6
  earth ground, 5-6
  symbols, 5-5
sales offices, 5-4
Save key, 2-10
saving
  calibration data, 3-11, 3-28
  data, 4-7
scale
  automatic scaling, 3-13, 3-29
  setting manually, 3-5, 3-23
Scale key, 2-10
SCPI index, 4-9
SCPI programming Help, 4-6
screen grid, 2-7
serial
  interface bus connector, 2-13
  number, network analyzer, 4-2
service
  guide, 1-5
  notes, 4-13
  offices, 5-4
  warnings, 5-7
setting
  date, 1-27
  time, 1-27
shipment
  for servicing, 5-3
  verifying initial, 1-3
shut down, 1-23
Smith chart, 3-19, 3-33
span, entering, 3-5, 3-23
S-parameter, selecting an, 3-4, 3-22
speed, 4-5
stability, 4-6
standard user description, 1-40
standards, calibration, 3-10, 3-27, 4-7
standby switch, 5-8
STANDBY symbol, 5-9
Start/Center key, 2-9
starting
  Help, 4-2
  the network analyzer, 1-23
status bar, 2-7
stimulus toolbar, 2-7
Stop/Start key, 2-9
sweep control toolbar, 2-6
Sweep Setup key, 2-9
Sweep Type key, 2-9
sweeping, fast, 4-5
switch
  On/Off, 1-23, 1-24, 2-4
  standby, 5-8
switching between measurements, 4-5

**T**

tab keys, 2-8
table of contents, 4-10
tables, 2-7

telephone number, Agilent, 4-3, 5-4
temperature, operating, 1-6
test
  operator's check, 1-45
  port, 2-4
  port bias input
    connector, 2-13
    fuse, 2-13
throughput, 4-3
  increasing, 4-5
time
  setting the, 1-27
  zones, 1-27
title bar, 1-31
toolbar
  active entry, 2-6
  marker, 2-7
  measurement, 2-7
  stimulus, 2-7
  sweep control, 2-6
tour, front and rear panel, 4-5
trace
  attributes, 3-2
  bar, 2-7
  memory, 4-8
  noise, 4-6
Trace key, 2-9
Trace Setup keys, 2-10
training, 4-13
trigger cable, 1-4
Trigger key, 2-9
turning off the analyzer, 1-23
tutorial, 4-8

U

unit terminators, 3-23
units keys, 2-11
Universal Serial Bus. See USB
up arrow key, 2-8
USB
  accessories, connecting, 1-16–1-22
  CD-ROM drive, 1-5
  connector, 2-4, 2-13
  hub, 1-5, 1-16
    connecting, 1-19, 1-20
  keyboard, 1-4
    connecting, 1-17, 1-21
  mouse, 1-4
    connecting, 1-17, 1-21
user
  adding a new, 1-37–1-44
  description, 1-40
  interface, 4-5
Utility keys, 2-10

V

ventilation requirements, 1-7, 5-6
verification kits, 4-13
verifying the shipment, 1-3
version, firmware, 4-2
VGA output connector, 2-13
video graphics adapter. see VGA
voltage, power requirements, 1-6

W

warnings, 5-5
  for servicing, 5-7
Web Help, 4-13
window
  attributes, 3-2
  control buttons, 2-6
Window key, 2-9
windows
  opening measurement, 3-12–3-14, 3-29–3-30
Windows 2000, accessing, 1-31
wizard, calibration, 3-8, 3-25

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